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Water Resources of the Housatonic River Basin:
Water Use and Hydrology

May 1999

Massachusetts Executive Office of Environmental Affairs
Department of Environmental Management
Office of Water Resources

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Water Resources of the Housatonic River Basin

Prepared for the
Massachusetts Water Resources Commission

by

Massachusetts Department of Environmental Management
Office of Water Resources

May 1999

Executive Summary
Water Resources of the Housatonic River Basin

This report provides the basic data and analysis needed to describe the hydrologic characteristics of the Housatonic River basin. The report should be used as a tool to help identify potential water resource problems, to resolve outstanding issues of resource use and protection, to inform regulatory activities, and to develop recommendations for community and regional water supplies and demand management activities.

The Housatonic River begins in the Berkshire Hills of western Massachusetts and flows about 159 miles south and southeast before emptying into Long Island Sound at Stratford, Connecticut. The river drains approximately 1,950 square miles of land located in the states of New York, Connecticut and Massachusetts. This report covers the 500 square mile portion of the basin located in Massachusetts.

For the purposes of this study, the basin has been broken down into the Main Stem and nine subbasins: East Branch, Southwest Branch, West Branch, Hop Brook, Larrywaug Brook, Williams River, Green River, Schenob Brook, Konkapot River. The communities included in the study area are: Alford, Dalton, Egremont, Great Barrington, Hinsdale, Lanesborough, Lee, Lenox, Monterey, New Marlborough, Pittsfield, Richmond, Sheffield, Stockbridge, Tyringham, Washington, West Stockbridge.

The 1990 federal census population for the study area was 92,147, however, more than half of the basin's population is in Pittsfield, the only urban center in the basin. Pittsfield's 1990 federal census population was 48,622. This was greater than the combined 1990 population of all the other basin communities (43,525).

Base water demand is the five year (1991 to 1995) average day demand for each community with a public water supply. The base water use for public water supplies in the Housatonic River basin was 15.96 million gallons per day (mgd). Of this amount, 9.87 mgd was used by the City of Pittsfield. Basin water needs are expected to increase to 16.54 mgd by 2020, with 9.29 mgd being needed by Pittsfield.

Most communities in the Housatonic River basin return the water used in public water supplies to the basin, either via on-site septic systems or through a public sewer system. Lanesborough is the only study area community which disposes a portion of its public water supply out-of basin, via on-site septic systems (an estimated 0.01 mgd in 1995).

Subbasin yields under natural conditions are high, compared to other basins in the state. Artificial losses or gains to the subbasins are generally small. However, the additional available yields for the Larrywaug Brook subbasin are reduced to zero for long term yields, due to

withdrawals by the Stockbridge Water Department. This does not mean that all the water within the subbasin is being "used up" or "dried out". Instead, it reflects that under low flow conditions, adequate water will not exist for development of another large long-term water supply.

Estimated yields are also significantly reduced in the East Branch subbasin, due to water supply withdrawals from the City of Pittsfield. In both the Larrywaug and East Branch subbasins, water supply withdrawals will not have a major impact on the subbasin because of the vast amount of storage available. Potential yields may be unaffected by outflows (withdrawals) due to the large surface water bodies located in these subbasins. All other subbasins are affected only slightly, or not at all, by water supply withdrawals.

The following streamflow threshold recommendations are made in the plan:

1. A flow of 0.64 cfsm is the minimum amount of flow that should be left instream during an average summer month. This flow should be used when evaluating projects which have the capacity to significantly affect the river such as large diversions or reservoirs.

2. Although there is no information available to determine an adequate spring streamflow which would sufficiently saturate wetlands and maintain the channel of the river without inducing transport of PCB contaminated sediments, the impacts of projects which could change the seasonal streamflow variation should be evaluated.

3. A minimum streamflow threshold between 0.20 cfsm and 0.46 cfsm should be used to conserve flows during low flow periods by regulating withdrawals through demand management.

4. Ground water withdrawals in watersheds containing wild trout streams should be carefully evaluated with respect to their effect on a flow of 0.27 cfsm.

5. A downstream flow release from water supply reservoirs with aquatic stream habitat should be established. A summary of the reservoirs for which flows could be established can be found in the DEP report: 1992 Housatonic River Tributary Biomonitoring Survey, Assessing Instream Impacts to Biota From Surface Water Supply Withdrawals.

The streamflow threshold numbers recommended here should not be considered optimum year-round flows for the river. A healthy environment is dependent on naturally varying streamflow levels. It is the intention of the basin plans that this natural variability be maintained.

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1.0 INTRODUCTION

1.1 The Watershed Initiative

A significant change in the Commonwealth's approach to managing the state's water resources occurred in 1993, with the adoption of the Watershed Initiative, a strategy to implement integrated, watershed-based resource management by establishing collaborative efforts among individuals, groups, and agencies with local, regional, state and federal responsibilities in each watershed. The watershed is the primary focus for coordinating and resolving resource management issues, such as local or seasonal water supply shortages, streamflow levels, fisheries and wildlife habitat protection, wastewater assimilation, etc. The Commonwealth is committed to preventing and solving resource problems and achieving resource protection by targeting limited financial and personnel resources to achieve the greatest environmental benefits.

A major focus of the Watershed Initiative is to better integrate water supply issues into the basin approach. In order to do this, it is necessary to have a sound hydrological foundation. This report, built on data that DEM's Office of Water Resources commissioned the USGS to collect and interpret, provides this hydrological basis for the activities of the Watershed Initiative.

1.2 River Basin Planning Program: Purpose and Process

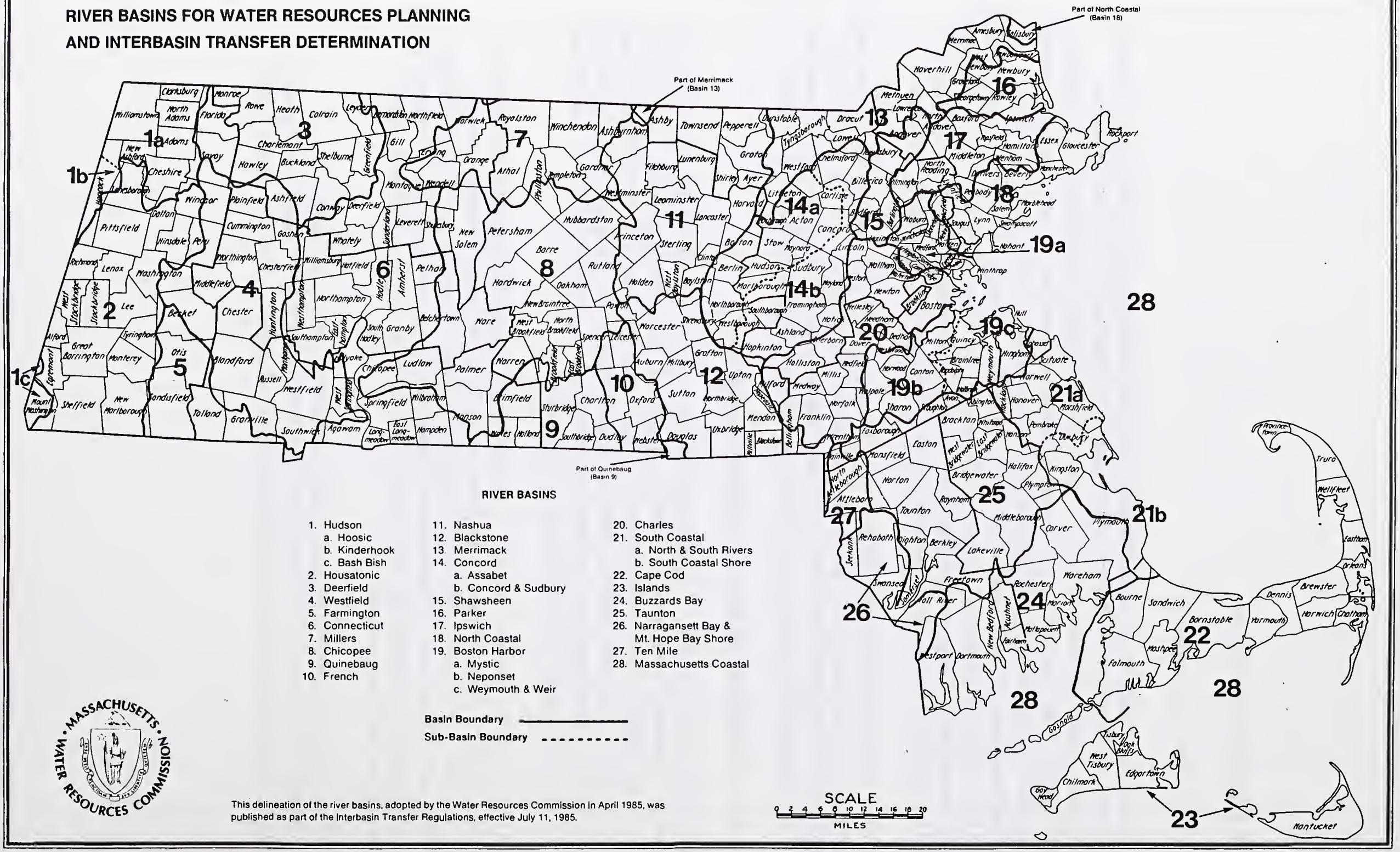
This report is one in a series of reports intended to provide a technical reference point for water resources planning, management, and decision-making at the local and watershed level. They provide the basic data and analysis needed to describe the hydrologic characteristics of the basin; to identify potential water resource problems; to resolve outstanding issues of resource use and protection; to inform regulatory activities; and to develop recommendations for community and regional water supplies and demand management activities.

The Massachusetts Water Resources Commission (WRC) has the primary responsibility for determining the state's water resources policy and directing the water resources planning activities for the Executive Office of Environmental Affairs. The Office of Water Resources (OWR), in the Department of Environmental Management, provides technical staff support to the Commission and is responsible, through the Commission, for long-range water resources planning for the Commonwealth.

OWR develops basin reports for each of the twenty-seven major river basins in the Commonwealth (Figure 1). The basin planning program is part of the state's overall goal of insuring that water is available in sufficient quantity and quality to meet current and future

Figure 1

RIVER BASINS FOR WATER RESOURCES PLANNING AND INTERBASIN TRANSFER DETERMINATION



RIVER BASINS

1. Hudson
   a. Hoosic
   b. Kinderhook
   c. Bash Bish
2. Housatonic
3. Deerfield
4. Westfield
5. Farmington
6. Connecticut
7. Millers
8. Chicopee
9. Quinebaug
10. French
11. Nashua
12. Blackstone
13. Merrimack
14. Concord
    a. Assabet
    b. Concord & Sudbury
15. Shawsheen
16. Parker
17. Ipswich
18. North Coastal
19. Boston Harbor
    a. Mystic
    b. Neponset
    c. Weymouth & Weir
20. Charles
21. South Coastal
    a. North & South Rivers
    b. South Coastal Shore
22. Cape Cod
23. Islands
24. Buzzards Bay
25. Taunton
26. Narragansett Bay & Mt. Hope Bay Shore
27. Ten Mile
28. Massachusetts Coastal

Basin Boundary ———

Sub-Basin Boundary - - - - - -

SCALE
0 2 4 6 8 10 12 14 16 18 20
MILES

MASSACHUSETTS • WATER RESOURCES COMMISSION

This delineation of the river basins, adopted by the Water Resources Commission in April 1985, was published as part of the Interbasin Transfer Regulations, effective July 11, 1985.

Executive Office of Environmental Affairs • Water Resources Commission

Prepared by the Department of Environmental Management • Division of Water Resources

consumptive and non-consumptive water needs. The basin planning process includes local, regional, and state assessments of water needs and the availability of water resources, and reflects the state's water resources management policies:

- Supply Management Utilizing local sources (those within a river basin) first and protecting all sources of water supply;

- Demand Management Practicing water conservation, full-cost pricing and other measures described in the 1992 Water Conservation Standards for the Commonwealth of Massachusetts;

- Administrative Management Strengthening local water management through financial and technical assistance and planning guidance. Based on the information and technical analyses in the basin plan and additional available data, OWR staff works with local or regional groups and other state agencies to develop recommendations in response to specific water management problems or issues. Staff works with those groups or agencies to identify the potential impacts of various options on the physical systems, and to develop a recommended course of action.

1.3 Study Area Description

The Housatonic River begins in the Berkshire Hills of Massachusetts and flows about 159 miles south and southeast before emptying into Long Island Sound at Stratford, Connecticut. The river drains approximately 1,950 square miles of land located in the states of New York, Connecticut and Massachusetts. About 500 square miles of this drainage area are located in Massachusetts. This report will concern itself mainly with the portions of the basin located in Massachusetts.

The Housatonic River basin provides many leisure and recreational attractions which draw many seasonal visitors. The Boston Symphony Orchestra makes its summer home at Tanglewood, in Lenox and Stockbridge. There are seven state forests and parks in the basin, and three ski areas. The Appalachian Trail crosses the study area.

1.3.1 Physical and geological setting

The headwaters of the mainstem of the Housatonic River are in Pittsfield at the confluence of the East Branch, West Branch and Southwest Branch of the Housatonic River. The upper portions of the basin generally have high relief, however the mainstem has a moderate gradient of 16.5 feet/mile. Downstream of the USGS streamflow gage at Great Barrington, for the 22 miles that it

flows to the Connecticut border, the river has a gradient of two feet/mile. Floodplain width varies throughout the basin depending on the bedrock geology. The portion of the Housatonic River upstream of the Great Barrington gage flows through steep narrow valleys bordered by the Berkshire Hills to the east and the Taconic Mountains to the west. The southern portion meanders through broad flat floodplains. Many of the tributary streams to the Housatonic River flow through high relief areas. For the purposes of this study, the basin has been broken down into nine subbasins and the Main Stem based on USGS low flow partial record stations and discontinued and continuous streamflow gaging stations. (Figure 2).

The subbasins are:

East Branch
Southwest Branch
West Branch
Hop Brook
Larrywaug Brook
Williams River
Green River
Schenob Brook
Konkapot River

The geology of the basin consists primarily of metamorphic rocks overlain by stratified drift. The bedrock bordering the eastern part of the valley is predominantly gneiss and quartzite; the western part of the valley is bordered by schist; and the valley itself is underlain by carbonate rocks and in some cases schist or quartzite.

Stratified drift deposits are limited to the river valleys and cover only 17% of the basin. Till covers the other portions of the basin. Stratified drift coverage is highly variable in tributary valleys. For example, Marsh Brook in Lenox has less than one percent coverage and the Green River in Great Barrington has seven percent coverage. Although larger amounts of stratified drift help to maintain flow in rivers in the summer months, some areas with little stratified drift, such as Karner Brook, maintain summer flows as high as areas with stratified drift. Norvitch et. al. (1968) theorized that these areas are underlain by highly fractured or jointed bedrock, however a recent U.S. Geological Survey flow study found no relationship between geology and high low flows (G. Bent, personal communication, 1997).

The coarsest stratified drift deposits, which are the best for water supply development, are confined to the Housatonic River tributaries. The stratified drift along the mainstem of the Housatonic River is somewhat finer, consisting of sand and silt (Norvitch et. al., 1968).

Notable wetlands within the basin, which have been designated as Areas of Critical Environmental Concern (ACECs), (see Figure 9, Section 2.2.3) are: Kampoosa Bog, the Karner Brook Watershed, the Schenob Brook Watershed, and Hinsdale Flats. There are 113 lakes and ponds in the basin, 70 of which are larger than 10 acres.

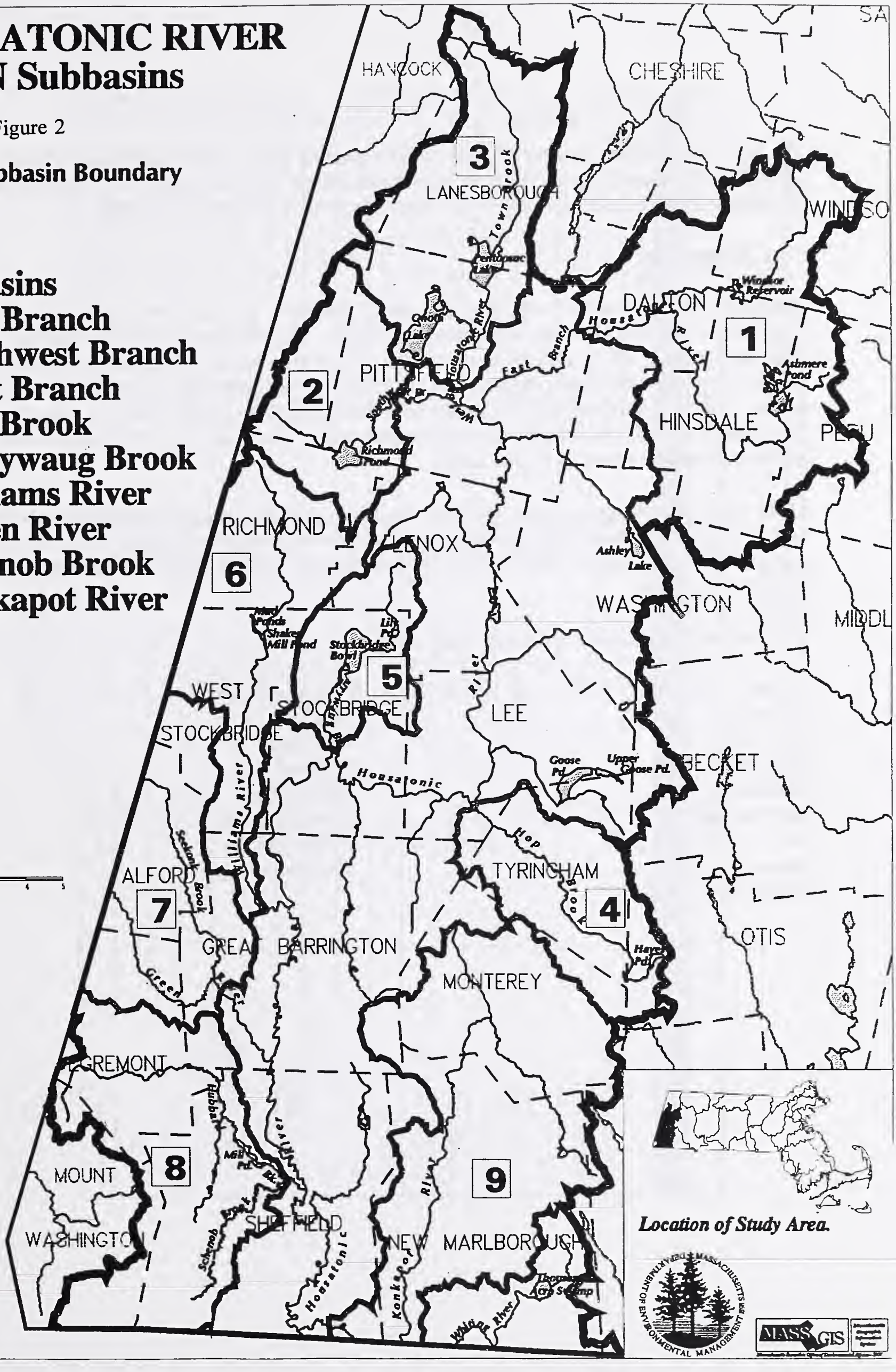
HOUSATONIC RIVER BASIN Subbasins

Figure 2

Subbasin Boundary

Subbasins

1) East Branch
2) Southwest Branch
3) West Branch
4) Hop Brook
5) Larrywaug Brook
6) Williams River
7) Green River
8) Schenob Brook
9) Konkapot River



Location of Study Area.

The area receives approximately 45 inches of precipitation yearly. According to the USGS, about 47% of the precipitation is lost to evapotranspiration. The remaining 53% runs off to the Housatonic River or collects in reservoirs, lakes and ponds (Norvitch et. al., 1968).

1.3.2 Demography

The study area is essentially a forested, rural area. Pittsfield is the only urban center in the basin. Pittsfield's 1990 federal census population was 48,622. This was greater than the combined 1990 population of all the other basin communities (43,525). Because Pittsfield is so different in character from the other basin communities, Pittsfield will be listed separately in all tables in this report, in order to separate the urban trends from the overall basin trends. Table 1 shows the 1990 federal census populations and the population projections to the year 2020 developed by the Berkshire Regional Planning Commission.

There are 26 Massachusetts towns with some land area in the Housatonic River basin, however, only 17 of these are included in the study area. For a community to be included in the study area it must have 50% or greater of its land area within the basin and/or a public water supply source located in the basin.

The communities included in the study area are:

Alford
Dalton
Egremont
Great Barrington
Hinsdale
Lanesborough
Lee
Lenox
Monterey
New Marlborough
Pittsfield
Richmond
Sheffield
Stockbridge
Tyringham
Washington
West Stockbridge

Table 1
Population Projections
Housatonic River Basin Study Area

COMMUNITY	1990	2000	2005♦	2010	2015♦	2020
ALFORD	418	460	480	500	550	600
DALTON*	7,155	7,079	7,085	7,090	7,435	7,780
EGREMONT	1,229	1,290	1,340	1,390	1,500	1,610
GREAT BARRINGTON	7,725	7,740	7,840	7,940	8,400	8,860
HINSDALE	1,959	2,050	2,120	2,190	2,355	2,520
LANESBOROUGH	3,032	2,960	2,965	2,970	3,110	3,250
LEE	5,849	5,790	5,825	5,860	6,165	6,470
LENOX	5,069	5,080	5,150	5,220	5,520	5,820
MONTEREY	805	890	935	980	1,075	1,170
NEW MARLBOROUGH	1,240	1,250	1,270	1,290	1,370	1,450
RICHMOND	1,677	1,860	1,965	2,070	2,270	2,470
SHEFFIELD	2,910	3,050	3,155	3,260	3,515	3,770
STOCKBRIDGE	2,408	2,390	2,410	2,430	2,560	2,690
TYRINGHAM	369	410	440	470	515	560
WASHINGTON	615	700	750	800	885	970
WEST STOCKBRIDGE	1,483	1,490	1,510	1,530	1,620	1,710
SUBTOTAL	43,525	44,029	44,760	45,490	48,295	51,100
PITTSFIELD	48,622	43,840	42,115	40,390	40,385	40,380
TOTAL	92,147	87,869	86,875	85,880	88,680	91,480

DEM/OWR

Source: Berkshire County Regional Planning Commission, March 1996
♦ DEM Projections based on Berkshire County Regional Planning Commission Projections
* Dalton's population number for 2000 provided by the Town

2.0 WATER RESOURCES OF THE HOUSATONIC RIVER BASIN

2.1 Human Impact on Water Resources

2.1.1 Public Water Supplies

Approximately 93% of the study area's total population is served by a public water supply. Of the communities within the study area, 11 have public water supplies[1]:

Dalton
Egremont
Great Barrington
Hinsdale
Lanesborough
Lee
Lenox
Pittsfield
Sheffield
Stockbridge
West Stockbridge

The town of Great Barrington is served by two water suppliers, the Great Barrington Water District and the Housatonic Water Works. In 1996, the town of Egremont purchased the privately owned South Egremont Water Company. For the purposes of this report, all public water supply data for the town of Egremont will refer to the Egremont Water Department. Table 2 shows the service population for each community with a public water supply in the basin.

In 1995, 98% of the water supplied by public water suppliers was from surface water sources. The remaining 2% was from ground water sources. Egremont, Great Barrington Fire District, Housatonic Water Works, Hinsdale, Lee, Lenox, Pittsfield and Stockbridge are supplied exclusively by surface water reservoirs. Dalton supplies most of its customers through surface water sources, however a small trailer park in town is served by the Fire District through a ground water well. Table 3 presents each community's sources by type and subbasin.

---

1 Monterey and New Marlborough both have small public water supplies which serve fewer than 1,000 people and use less than 10,000 gallons per day. These will be treated as self-supplied communities.

Table 2
Service Population
Housatonic River Basin

WATER SUPPLIER	1990 FEDERAL CENSUS	PERCENT SERVICE POPULATION	CUSTOMERS RESIDING IN OTHER TOWNS	SEASONAL POPULATION FACTOR(1)	BASE SERVICE POPULATION
DALTON FD	7,155	94%	--	--	6,726
EGREMONT	1,229	24%	--	100	400
GREAT BARRINGTON	7,725				
Great Barrington FD		52%			4,000
Housatonic WW		35%	100	--	2,800
HINSDALE DPW	1,959	61%	--	100	1,300
LANESBOROUGH F & WD	3,032	74%	--	25	2,275
LEE W DEPT	5,849	90%	10	2,500	7,774
LENOX W DEPT	5,069	88%	108	2,400	6,982
SHEFFIELD WD	2,910	61%	--	--	1,764
STOCKBRIDGE WD	2,408	75%	--	250	2,050
WEST STOCKBRIDGE WD	1,483	78%	--	250	1,407
Subtotal	38,819				37,477
PITTSFIELD DPW	48,622	100%	--	--	48,622
TOTAL	87,441				86,099

DEM/OWR

(1) Because most seasonal residents are present only for approximately three months out of the year, the total seasonal population for a community is discounted by a factor of four and distributed throughout the year.

Table 3
Public Water Supply Sources
and 1995 Withdrawals
by Subbasin
Housatonic River Basin

Community	Water Supply Source	Type of Source	1995 Withdrawal (mgd)	Subbasin
Dalton FD	Egypt Reservoir Windsor Reservoir Cleveland Res. Trailer Park Well	SW SW SW GW	0.14 0.29 1.41 0.01	East Branch East Branch East Branch East Branch
Egremont WD	Karner Brook	SW	0.12	Schenob Brook
Great Barrington FD	Hurlbert Road Infiltration Gallery	SW	0.94	Main Stem
Housatonic WW	Long Pond	SW	0.36	Green River
Hinsdale DPW	Belmont Reservoir	SW	0.22	East Branch
Lanesborough F & WD	Bridge St. Well #1 Miner St. Well #2	GW GW	0.26 (combined)	West Branch
Lee Water Dept	Vanetti Reservoir Leahey Reservoir	SW SW	0.76 0.10	Main Stem Main Stem
Lenox Water Dept	Lower Root Res. Upper Root Res.	SW SW	0.73 (combined)	Williams River
Pittsfield DPW*	Cleveland Res. Farnum Reservoir Ashley Reservoir Sackett Reservoir	SW SW SW SW	6.21 2.72 0.29 0.26	East Branch Main Stem Main Stem Main Stem
Sheffield WC	Mass Pike Well Water Farms Spring Hubbard Brook Well	GW GW GW	0.06 0.01 0.05	Main Stem Main Stem Main Stem
Stockbridge WD	Lake Averic	SW	0.36	Larrywaug Brook
West Stockbridge WD	Sartori Springs Replacement Well	GW	0.05	Williams River

DEM/OWR

* Does not include water sold or furnished to the Dalton FD

The Pittsfield DPW Water Division is by far the largest public water supply user in the basin. In 1995, the city used 9.43 mgd, 61% of the total amount of water used by all the municipal water supplies in the basin that year. The combined water use for all other municipal water suppliers in the basin was 6.10 mgd.

Chapter 285 of the Acts of 1947, which gave Pittsfield authorization to construct the Cleveland Reservoir, granted the Dalton Fire District the right to be supplied with water from that reservoir. The amount of water that the Dalton FD receives under this Act is reported to DEP by both communities in their annual statistical reports. For the purposes of this report, this water has been assigned to the Dalton FD, to avoid double counting. Pittsfield's and Dalton FD's water use reported here, both current and future, will reflect their actual consumption, rather than actual withdrawals from their sources.

Water use in the basin for the base period 1991 to 1995 is presented in Table 4.

Water Management Act

The 1986 Massachusetts Water Management Act (WMA) (MGL Ch. 21G) and its regulations (310 CMR 36.00) call for comprehensive management of the Commonwealth's surface and ground water resources in order to ensure an adequate supply of water for all citizens now and in the future.

The Act authorizes the Department of Environmental Protection (DEP) to regulate and monitor significant water withdrawals from Massachusetts ground and surface water supplies and gives DEP greater authority than it previously had to manage water supply emergencies.

Implementation of the Act has taken place in two phases: registration of withdrawals from existing sources and permitting of the volume of water withdrawn from new sources.

Registered volume refers to the average amount of water withdrawn from a community's sources between 1981 and 1985. All those withdrawing more than an average of 100,000 gallons per day (gpd) during the 1981-1985 period were required to register their withdrawals by January 4, 1988. Public water suppliers registered 18.92 mgd from the Housatonic River basin. Of this amount, 13.50 mgd were registered by Pittsfield, 5.42 mgd were registered by all other communities.

Table 4
Base Water Use
(mgd)
1991 to 1995
Housatonic River Basin

COMMUNITY	1994	1992	1993	1994	1995	AVERAGE
DALTON FD	1.85	1.92	1.77	1.84	1.85	1.82
EGREMONT WD	0.12	0.13	0.12	0.14	0.12	0.12
GREAT BARRINGTON FD	1.09	1.01	0.95	1.05	0.94	1.01
HOUSATONIC WW	0.40	0.12	0.36	0.41	0.36	0.39
HINSDALE DPW	0.29	0.29	0.27	0.18	0.22	0.25
LANESBOROUGH F & WD	0.28	0.28	0.29	0.28	0.26	0.27
LEE WATER DEPT	1.04	1.04	0.98	0.97	0.86	0.99
LENOX WATER DEPT	0.70	0.68	0.72	0.73	0.78	0.72
SHEFFIELD WC	0.14	0.14	0.14	0.14	0.12	0.13
STOCKBRIDGE WD	0.32	0.32	0.34	0.37	0.36	0.35
WEST STOCKBRIDGE WD	0.03	0.04	0.04	0.05*	0.05*	0.04
SUBTOTAL	6.22	6.28	5.98	6.12	5.92	6.10
PITTSFIELD DPW	9.24	9.23	10.74	10.70	9.43	9.87
TOTAL	15.46	15.49	16.72	16.82	15.35	15.97

DEM OWR

* West Stockbridge Water District was in the process of upgrading and replacing its water distribution system in 1994 and 1995. This number represents estimated water consumption

Permitted volumes reflect withdrawals from new sources over 100,000 gpd or withdrawals from registered sources of 100,000 gpd above the volumes previously registered. Permits are issued for 20 year periods. Permitting in the Housatonic River basin began in 1992, however most communities' water use was either lower than or within 100,000 gallons of their registered amounts (see Table 5 for a comparison of registered water use, actual water use in 1992, the beginning of permitting, and 1995 water use). Only one public water supply (Hinsdale) is permitted under the WMA in the Housatonic River basin. Three industrial water users (Atresco Pittsfield L.P., Mead Specialty Paper and Schweitzer-Mauduit International Inc. - formerly Kimberly-Clark) have been issued permits.

Public Water Supply Trends

There have been no discernible basin-wide trends in water use. Comparing average water use for the time period when DEP required registration under the Water Management Act (1981 to 1985) to the base demand period used in DEM water needs forecasts (1991 to 1995), five communities experienced increases in public water supply use, and five experienced decreases (Figure 3). One community's water use remained stable. DEM projects that water use will remain relatively stable over the twenty-five year planning period, increasing only four percent over the base, by 2020 (Table 6). Public water suppliers have also implemented water conservation measures to varying degrees. This will be discussed further in Section 3.2.

Ability of Public Water Supplies to Meet Future Demand

Under normal conditions, the Housatonic River basin communities with public water supplies all have adequate sources of supplies to meet their average daily needs. However, should population or economic trends change, or should the region experience a moderate drought (such as the drought of 1981 - 1982) or severe drought (such as the drought of record, which occurred in the 1960's), these sources would need to be reevaluated, and may need to be augmented. In order to forestall any potential problems with water supply, each water supply system in the basin should institute the system efficiency and demand management measures outlined in the 1992 Water Resources Commission Water Conservation Standards for the Commonwealth of Massachusetts.

Water Conservation/Water Supply System Efficiency Recommendations

As stated earlier, all public water suppliers have instituted water conservation and system efficiency measures to some degree. Appendix A lists measures taken by each water supplier. The biggest deficiency in this area is the general lack of universal metering (including public buildings) and the absence of regular water audits or leak detection surveys.

All water suppliers, which have not done so already, should implement a program to achieve 100% metering of all customers (including public buildings). Regularly scheduled meter testing and repair should be part of this program. In addition, periodic water audits should be performed

Table 5
Public Water Supply
Registration Under the Water Management Act
and 1992 Water Use
(mgd)
Housatonic River Basin

COMMUNITY	REGIS-TRATION (1981-1985)	ACTUAL WATER USE AT TIME OF PERMITTING (1992)	1995 WATER USE
DALTON FD*	1.37	1.61	1.85
EGREMONT WD	**	0.13	0.12
GREAT BARRINGTON FD	1.09	1.61	0.94
HOUSATONIC WW	0.27	0.42	0.36
HINSDALE DPW	**	0.29	0.22
LANESBOROUGH F & WD	0.21	0.24	0.26
LEE W DEPT	1.13	0.68	0.86
LENOX W DEPT	0.76	0.68	0.78
SHEFFIELD WC	0.30	0.13	0.12
STOCKBRIDGE WD	0.29	0.32	0.36
WEST STOCKBRIDGE WD	**	0.03	0.05
SUBTOTAL	5.42	5.95	5.92
PITTSFIELD DPW	13.50	9.90	9.43
TOTAL (mgd)	18.92	15.85	15.35

DEM/OWR

* In 1992, Dalton used 0.32 from its own sources. The balance of its demand was met from sources operated by the Pittsfield Water Department.

** Community did not register

Figure 3

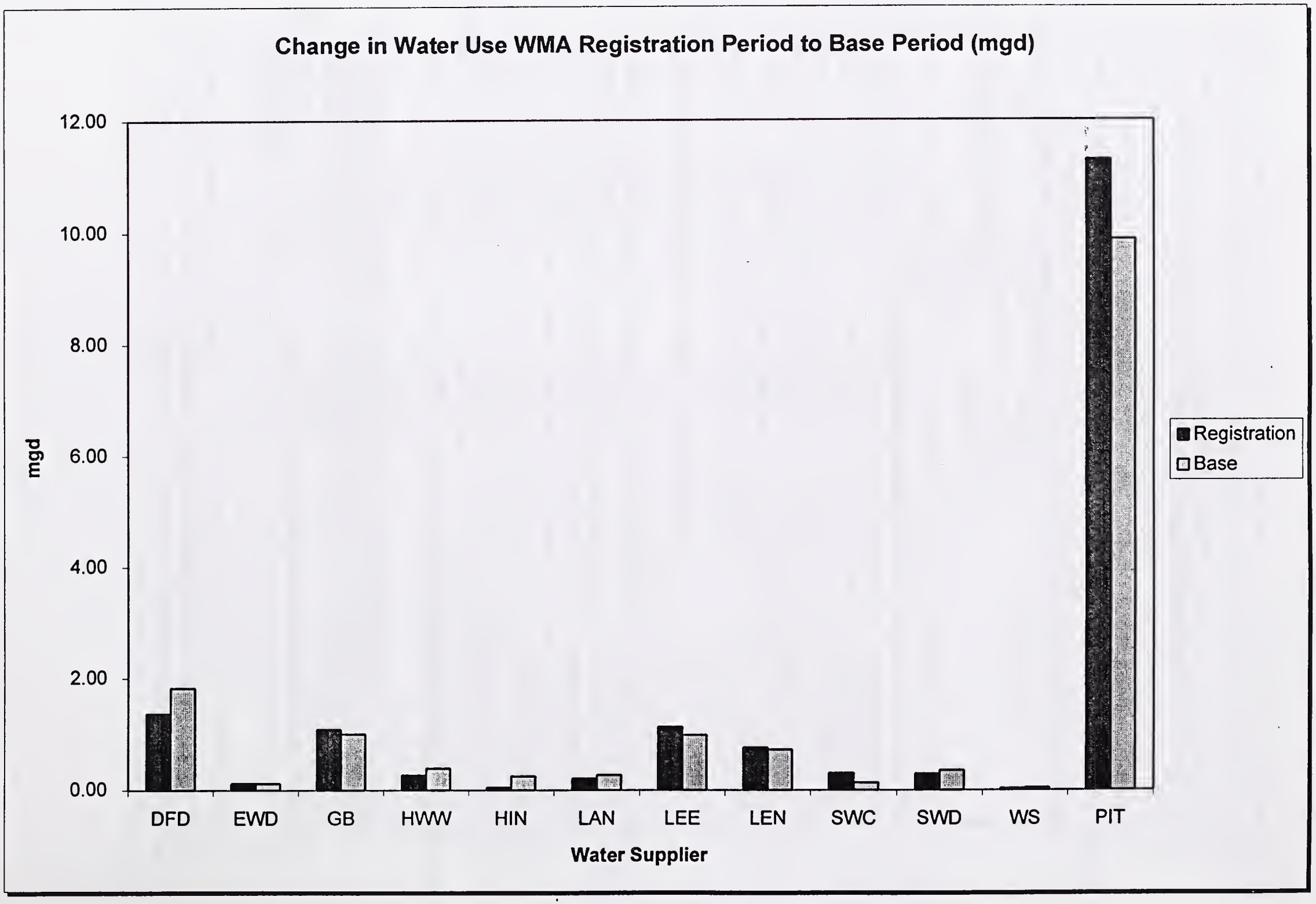

Change in Water Use WMA Registration Period to Base Period (mgd)
12.00
10.00
8.00
6.00
4.00
2.00
0.00
mgd
DFD
EWD
GB
HWW
HIN
LAN
LEE
LEN
SWC
SWD
WS
PIT
Water Supplier
Registration
Base

Table 6
Water Needs Forecasts
(mgd)
Housatonic River Basin

COMMUNITY	WMA Registration	BASE WATER USE 1991-1995	PROJECTIONS 2000	2005	2010	2015	2020
DALTON FD	1.37	1.82	1.87	1.91	1.96	2.08	2.24
EGREMONT	---	0.12	0.12	0.12	0.12	0.13	0.13
GREAT BARRINGTON							
Great Barrington FD	1.09	1.01	1.02	1.02	1.03	1.06	1.08
Housatonic WW	0.27	0.39	0.39	0.39	0.40	0.41	0.42
HINSDALE DPW	---	0.25	0.26	0.26	0.27	0.28	0.29
LANESBOROUGH F & WD	0.21	0.27	0.27	0.27	0.27	0.28	0.30
LEE W DEPT	1.13	0.99	1.06	1.15	1.19	1.27	1.35
LENOX W DEPT	0.76	0.72	0.71	0.73	0.75	0.79	0.83
SHEFFIELD WC	0.30	0.13	0.14	0.14	0.15	0.16	0.17
STOCKBRIDGE WD	0.29	0.35	0.35	0.36	0.37	0.39	0.40
WEST STOCKBRIDGE WD	---	0.04	0.04	0.04	0.04	0.05	0.05
SUBTOTAL (mgd)	5.42	6.09	6.24	6.39	6.54	6.89	7.25
PITTSFIELD DPW*	13.50	9.87	9.54	9.41	9.29	9.29	9.29
TOTAL (mgd)	18.92	15.96	15.78	15.80	15.83	16.18	16.54

DEM/OWR

* Does not include water provided to Dalton

to determine where to focus water saving efforts. A thorough water audit will help determine the frequency of regular leak detection surveys. Copies of the 1992 Water Conservation Standards will be mailed to each water supplier with suggestions on how their water supply system can meet the standards.

2.1.2 Self-Supplied Water Uses

It is estimated that approximately 0.88 mgd was used by self-supplied communities and self-supplied portions of communities with public water supplies (i.e. communities which do not serve 100% of their populations). This figure was derived by multiplying the estimated self-supplied population by 79 gallons per capita per day[2]. In addition, nine commercial, industrial and agricultural water users registered a total of 15.16 mgd under the Water Management Act. These users, and their registered water use, appear in Table 7. One of these self supplied users, Mead Paper, obtained a WMA permit that allowed it to withdraw an additional 0.88 mgd by 1997. An additional industrial water user, Altresco Pittsfield L.P., did not register, but has since obtained a WMA permit for 1.58 mgd.

The largest self-supplied water users are the paper companies (Crane and Co., Kimberly Clark, now known as Schweitzer-Mauduit International Inc., Mead Paper, and the Rising Paper Company), which are registered for a total of 13.67 mgd (90% of the total self-supplied water use). All of the paper companies but one (Crane and Co.) take their water supplies from the main stem through a combination of wells and direct river withdrawals. Crane and Co.'s water supply sources are located in the East Branch Housatonic subbasin.

Water is a key resource for making paper, however, according to DEP, very little is consumed in the process. All of the paper companies in the Housatonic River basin, with the exception of the Rising Paper Company, have NPDES permits for industrial wastewater treatment plant discharges. The Rising Paper Company discharges to the Housatonic Wastewater Treatment Plant in Great Barrington. These discharges are located in the same subbasin as their industrial

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[2] The WRC guidelines for residential water use is 80 gallons per capita per day for Method 1 communities and 70 for Method 2 communities (see Demand Projection Methodology in Appendix A). The figure of 79 was chosen to include both residential and nonresidential water use for self-supplied users and communities.

Table 7
Nonresidential Water Users
Registered Under the Water Management Act
Housatonic River Basin

User	Town	Amount (mgd)
Berkshire Trout Hatchery	Great Barrington	0.33
Butternut Basin Ski Area	Great Barrington	0.89
Crane & Co. Inc.	Dalton	4.20
Cranwell Conference Center	Lenox	0.06
Kimberly Clark Corporation	Lee	6.00
Lowland Farm	Monterey	0.04
Mead Paper	Lee	2.21
Pittsfield Country Club	Pittsfield	0.17
The Rising Paper Company	Housatonic	1.26
Total (mgd)		15.16

Source: Department of Environmental Protection

water supply withdrawals. A small amount of water is lost in the process, but the effect on the net inflow-outflow of the subbasin is negligible.

2.1.3 Wastewater Treatment and Inflow-Outflow

Most communities in the Housatonic River basin return the water used in public water supplies to the basin, either via on-site septic systems or through a public sewer system. Approximately 93% of all the water used by public water supply customers is returned to the basin via public sewer systems (See Table 8). Pittsfield's sewerage treatment plant accepts wastewater from Dalton, Hinsdale, and Lanesborough. Great Barrington, Lee, Lenox, Stockbridge and West Stockbridge all have municipal wastewater treatment plants which process a portion of each communities' wastewater.

Lanesborough has 27% of its land area, but only a small portion of its service area, in the Hoosic basin. It is the only study area community which disposes a portion of its water public water supply out-of basin, via on-site septic systems (an estimated 0.01 mgd in 1995). See Table 9.

2.1.4 PCB Contamination of the Housatonic River

One of the major water resource issues facing the Housatonic River basin is PCB contamination of portions of the main stem. Clean up of the river is being administered under the federal Resource Conservation and Recovery Act (RCRA) and is beyond the scope of this report. However, any management of water resources should recognize this serious water quality problem.

For the most part, the movement of PCB can be related to the movement of sediment in the river. Preliminary findings of the DEM/USGS study of sediment transport in the river indicate that most of sediment movement occurs downstream of the Great Barrington stream gage. There are several possible reasons for higher sediment content in the lower reaches of the river in Massachusetts:

(1) there are several dams above Great Barrington which tend to trap sediment in the impoundments, reducing the concentrations of suspended material moving downstream
(2) the channel slope is significantly flatter below the Great Barrington gage resulting in the river having a greater ability to erode its streambed and banks
(3) erodible soil types appear to be more prevalent in this area

Table 8
Estimated Amount of Water (mgd)
Discharged to Municipal Wastewater Facilities 1995
Housatonic River Basin

COMMUNITY	1995 ADD	% SEWERED	VOLUME SEWERED
DALTON FD	1.85	98%	1.81
EGREMONT WD	0.12	0%	0.00
GREAT BARRINGTON FD	0.94	99%	0.93
HOUSATONIC WW	0.36	80%	0.29
HINSDALE DPW	0.22	86%	0.19
LANESBOROUGH F & WD	0.26	10%	0.03
LEE W DEPT	0.86	95%	0.82
LENOX W DEPT	0.78	62%	0.48
PITTSFIELD DPW	9.43	100%	9.43
SHEFFIELD WC	0.12	0%	0.00
STOCKBRIDGE WD	0.36	75%	0.27
WEST STOCKBRIDGE WD	0.05	100%	0.05
TOTAL MGD SEWERED	15.35	93%	14.30

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Table 9
Public Water Supply Wastewater Disposal
by Subbasin (mgd) 1995
Housatonic River Basin

COMMUNITY	1995 ADD	MAIN STEM	EAST BRANCH	GREEN RIVER	SCHENOB BROOK	WILLIAMS RIVER	KONKAPOT RIVER	WEST BRANCH	LARRYWAUG BROOK	SOUTH-WEST BRANCH	HOOSIC RIVER BASIN
DALTON FD	1.85	1.84	0.01								
EGREMONT WD	0.12				0.12						
GREAT BARRINGTON FD	0.94	0.94									
HOUSATONIC WW	0.36	0.29				0.07					
HINSDALE DPW	0.22	0.19	0.23								
LANESBOROUGH F & WD	0.26	0.02						0.23			0.01
LEE W DEPT	0.86	0.86									
LENOX W DEPT	0.78	0.72				0.01			0.05		
PITTSFIELD DPW	9.43	9.43									
SHEFFIELD WC	0.12	0.09			0.03						
STOCKBRIDGE WD	0.36	0.34							0.02		
WEST STOCKBRIDGE WD	0.05					0.05					
TOTAL (mgd)	15.72	14.72	0.23	0	0.15	0.13	0	0.23	0.07	0	0.01

DEM/OWR

(4) there is a much greater percentage of agricultural land area in this portion of the basin, which generally results in more exposure of erodible soils.

The suspended sediment discharge (tons per square mile) measured in the river at Ashley Falls (Massachusetts/Connecticut border) is more than double that measured at the Great Barrington gage (G. Bent, USGS, personal communication, 1997). Movement of PCB in the river may a follow similar pattern, with most being deposited behind mainstem dams. It must be stressed that this information is preliminary, and should not be used to draw conclusions concerning the transport of PCB until the data have been further refined.

For further information on this issue contact EPA and DEP.

2.2 Hydrology

2.2.1 Introduction

Flow in the Housatonic River is normally highest in the spring and lowest in the summer. The average annual flow measured at the Great Barrington gage is 523 cubic feet per second (cfs), based on flows measured for the period of record from 1913 to the present. The average monthly flow varies from 241 cfs in August to 1,244 cfs in April. Flows per square mile of drainage area on the East Branch Housatonic River are about the same as those downstream in Great Barrington. The monthly flow at these sites have been converted to flow in cubic feet per square mile (cfsm) for comparison in Figure 4.

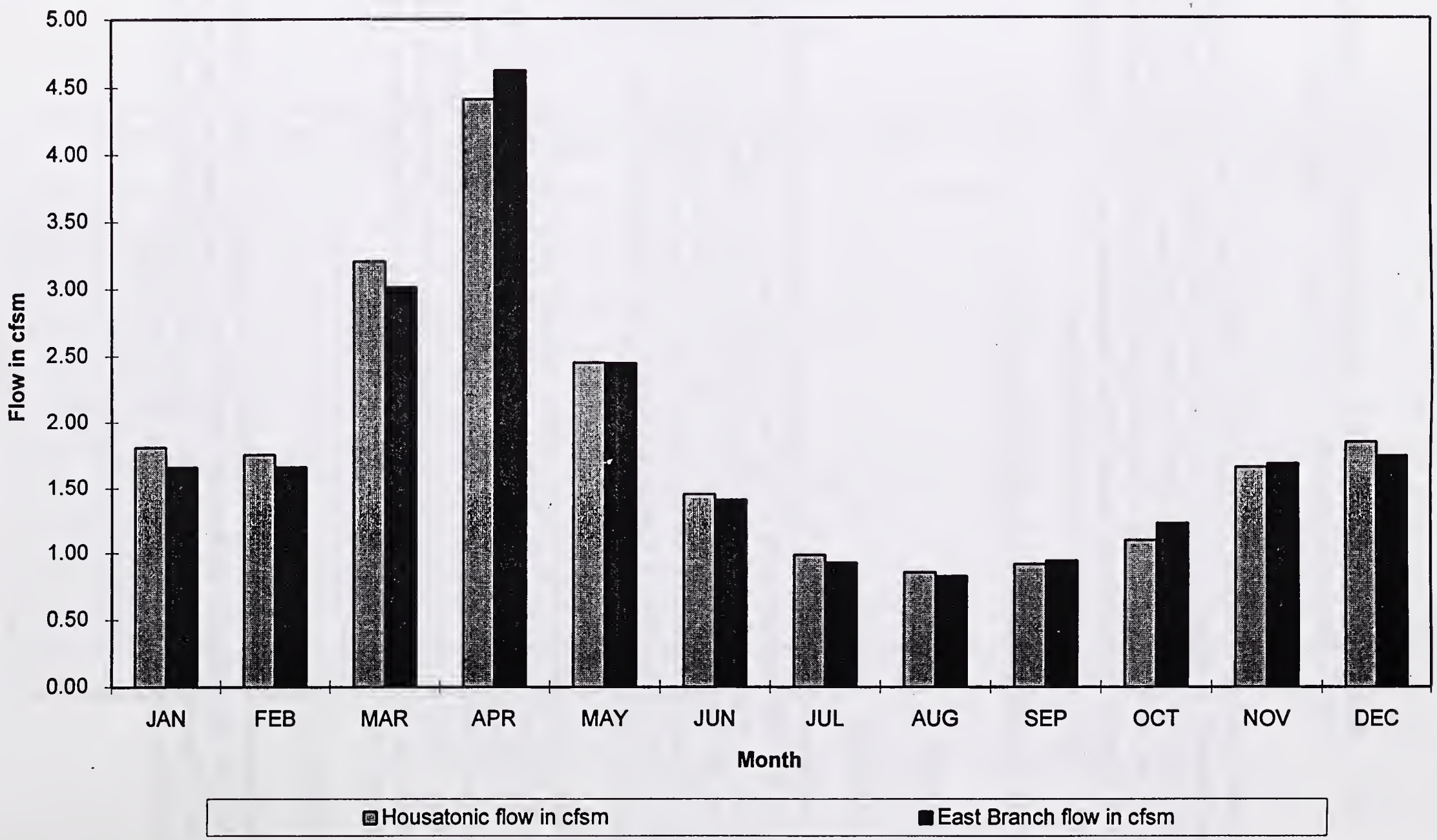
Streamflow at the Great Barrington gage has been measured since 1913. Prior to 1970, flows were more regulated by dams and reached lower levels than they do currently. These low flows are shown in Figure 5, the flow duration curves for the Housatonic River and the East Branch of the Housatonic River. The portion of the Housatonic River curve which falls below the East Branch curve represents flows which occurred before 1970. Prior to 1929 the flows were even lower. Although the data indicate the flows were regulated, it is unclear whether this regulation was due to industry or water supply withdrawals.

2.2.2 Subbasin Yields

The nine delineated tributary subbasins account for approximately 322 square miles of the watershed. The remaining 178 square miles of the 500 square mile basin in Massachusetts comprise the Housatonic mainstem subbasin. The subbasins were delineated based on natural, regional drainage divides and the availability of stream gage data.

Figure 4

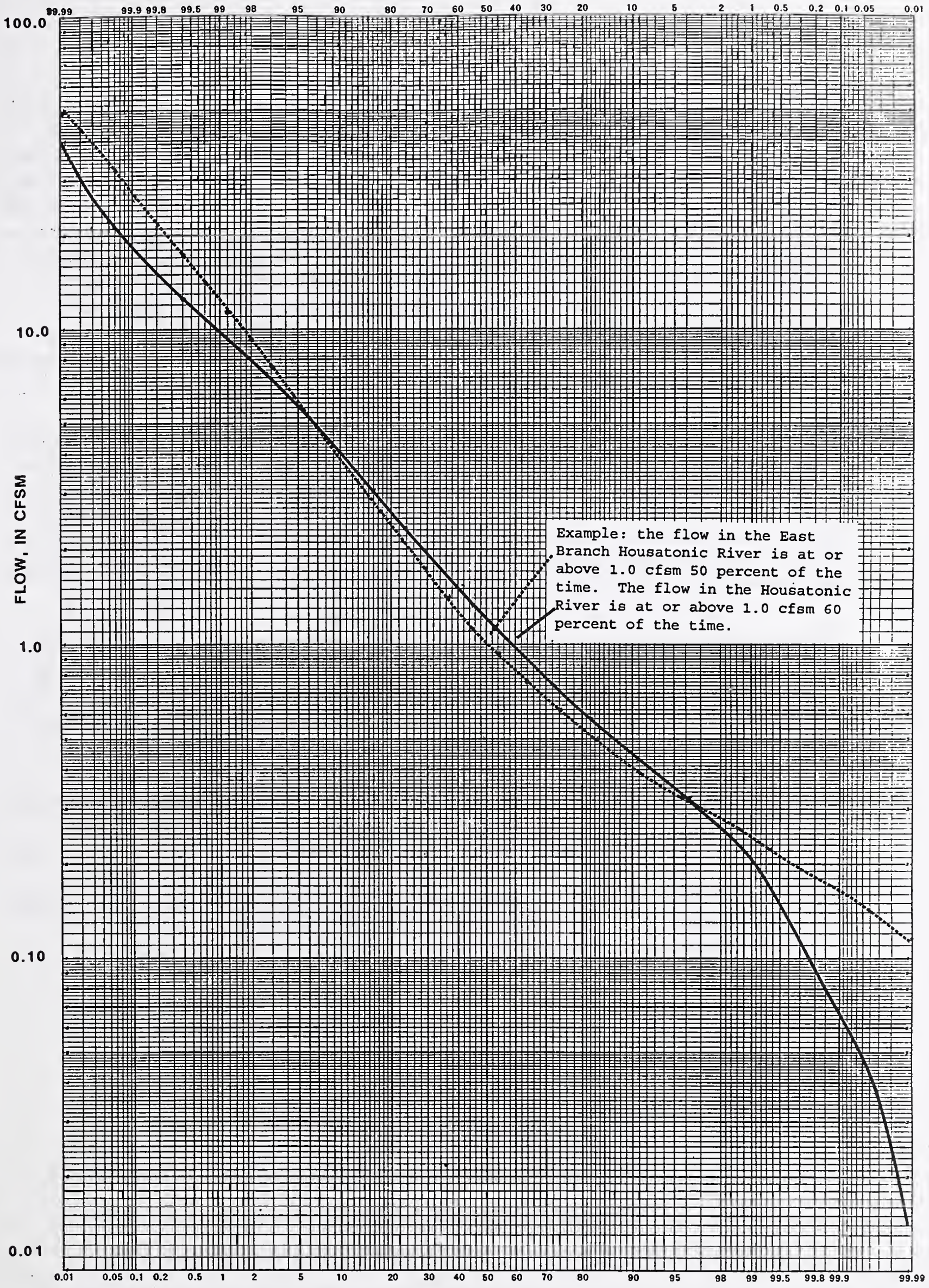
Housatonic River at Great Barrington
East Branch Housatonic River
Monthly Flow in cfsm



10/23/974:20 PM

01197500 HOUSATONIC RIVER NEAR GREAT BARRINGTON

01197000 EAST BRANCH HOUSATONIC RIVER AT COLTSVILLE



PERCENT OF TIME FLOW IS EQUALED OR EXCEEDED

Figure 5 Flow Duration Curve

Subbasin yields are an estimate of the potential reliable yield of a subbasin in times of low flow conditions. Yields have been assigned to each subbasin based on calculated flow duration values. The 95% flow duration[3] value has been selected for estimating the yield of the subbasins in the Housatonic Basin. Two different methodologies were used to calculate the yields; most of the subbasin yields were calculated using low flow partial-record stations and discontinued and continuous streamflow-gaging stations. At two stations, the West Branch of the Housatonic and Larrywaug Brook, yields were calculated using generalized-least-squares regression models to estimate low-flow duration discharges. This methodology was used here because after the original seven subbasins had been delineated and field monitoring had begun, these two subbasins were identified as providing significant contributions to overall hydrology of the Housatonic River basin. The two methodologies are compatible and should produce similar flow estimates.

Table 10 lists the yields of each subbasin under natural flow conditions as well as the resultant yields after adding or subtracting subbasin withdrawals for public water supply or inputs from wastewater discharge. With the exception of the West Branch, water remains entirely within basin, being transferred only between subbasins. A small amount of water is transferred into the Hoosic basin from the West Branch subbasin, via the Lanesborough Water Department. Also included in the table is the August median flow for the nine subbasins, and the resultant changes due to subbasin inflow/outflow.

Subbasin yields under natural conditions are quite high, compared to other basins in the state. Artificial losses or gains to the subbasins are generally quite small. However, the additional available yields for the Larrywaug Brook subbasin are reduced to zero for long term yields, due to withdrawals by the Stockbridge Water Department. This does not mean that all the water within the subbasin is being "used up" or "dried out". Rather, it reflects that under low flow conditions, adequate water will not exist for development of another large long-term water supply. Estimated yields are also significantly reduced in the East Branch subbasin, due to water supply withdrawals from the City of Pittsfield. In both of these subbasins, water supply withdrawals will have notably less impact on the subbasin than the table indicates because of the vast amount of storage available in the subbasins. Potential yields may be unaffected by outflows (withdrawals) due to the large surface water bodies located in the subbasins. All other subbasins are affected only slightly, or not at all, by water supply withdrawals.

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[3] The river flow that will be equaled or exceeded 95% of the time.

Table 10
Subbasin Yields and Human Influence
on Subbasin Hydrology
Housatonic River Basin

	Unadjusted Flow			Flow Adjusted to Account for Human Use		
Subbasin	August Median Flow (cfs)	Subbasin Yield (cfs)	Subbasin Yield (mgd)	August Median Flow (cfs)	Subbasin Yield (cfs)	Subbasin Yield (mgd)
Main Stem	103.10	72.10	46.60	126.70	89.25	57.68
East Branch	29.00	19.00	12.28	15.89	5.69	3.68
Green River	8.40	4.70	3.04	7.85	4.15	2.68
Schenob Brook	13.70	6.46	4.18	14.02	6.52	4.21
Williams River	15.00	6.95	4.49	14.00	5.95	3.85
Konkapot River	29.80	19.30	12.47	29.80	19.30	12.47
West Branch	8.64	2.17	1.40	8.32	1.84	1.19
Larrywaug Brook	2.00	0.31	0.20	1.54	0.00	0.00
Southwest Branch	4.19	2.23	1.44	4.19	2.23	1.44
Hop Brook	5.16	2.74	1.77	5.16	2.74	1.77
Cumulative	219.00	136.00	87.90	219.20	135.80	87.77

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2.2.3 Housatonic River Water Uses and Streamflow Criteria

A knowledge of the instream and out-of-stream water uses, their locations and interactions is necessary in order to provide a framework for water resources planning and regulatory activities. Tables 11 through 16 detail the different uses of the Housatonic River and its tributaries and the streamflows (in cfsm) necessary to support these uses. Table 17 gives a summary of all flow needs in the basin. Water use and streamflow data were provided by state and federal agencies, and private recreational concerns, where available. In some cases, streamflows were calculated based on other criteria, such as velocity and depth, using measurements made at five USGS partial flow measurement sites in the basin. The source(s) of the information is provided with each water use.

The flows provided represent the lowest flows necessary to maintain a water use, but they do not always reflect the optimum flows necessary to enhance and support a water use. The minimum flow is usually representative of the minimum condition which the use can withstand for a short duration. Where optimum flow conditions were available they have been provided.

Where information is available on the type and location of water use, but no flow criteria are available there is an "na." All the data includes the location of the water use. Unless otherwise noted, the flows have been normalized by converting them to cfsm, which allows for a comparison of different water needs across the watershed.

The time of year for each water use can reflect the time of year which is critical, or in the case of recreation, ideal for a given water use.

HOUSATONIC RIVER BASIN

Figure 6

CANOEING

RAPIDS/HIGH WATER

FLAT WATER

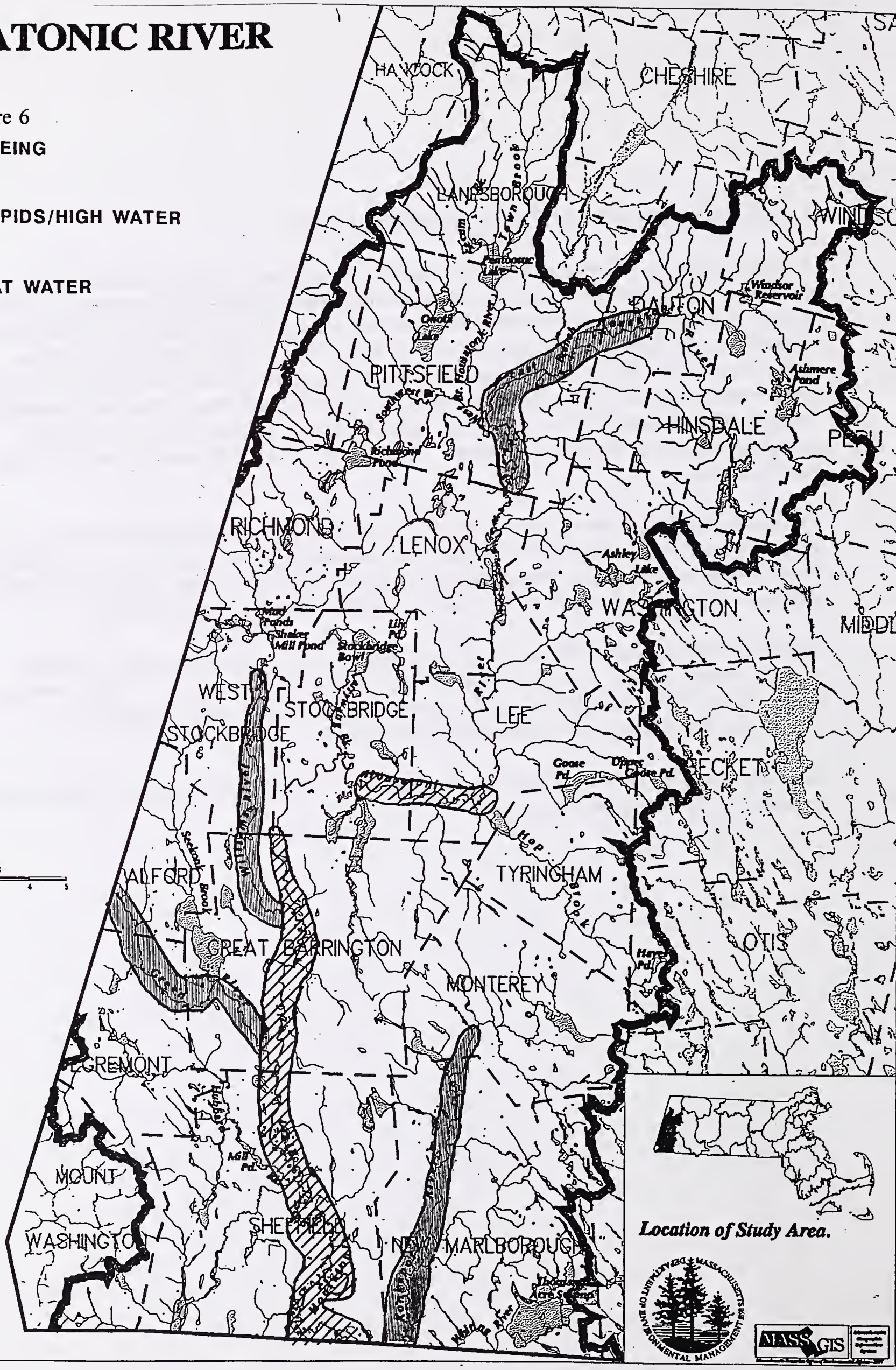

Table 11
Flow Needs
Recreation - Canoeing
Housatonic River Basin

The Housatonic River and its tributaries have several sections which are good for canoeing. The sections are summarized below and on the map:

Location	Type of water	Time of Year	Min. Flow* (cfsm)	Opt. Flow** (cfsm)
East Branch Housatonic River and Housatonic River mainstem - from Dalton through Pittsfield	Some rapids, not generally recommended for canoeing - high water	spring	0.35	na
Housatonic River - From just above mouth of Hop Brook to Stockbridge/Lee town line	Mostly flat water	summer	0.46	0.96 - 1.77
Housatonic River - Great Barrington to Falls Village (Connecticut)	mostly flatwater, some rapids	summer	0.46	0.96 - 1.77
Green River	mostly short rapids - high water	spring	0.37	na
Konkapot River	mostly rapids - high water	spring	0.20	na
Williams River	mostly rapids - high water	spring	0.21	na

*Minimum flow is the flow necessary for canoe passage
**Optimum flow is the flow or range of flows which provide the best conditions for this type of activity.
na = Not available

Source - Appalachian Mountain Club Guide; U.S. Dept of the Interior, Bureau of Outdoor Recreation

HOUSATONIC RIVER BASIN

Figure 7

FISHERIES

LONGNOSE SUCKER

WILD TROUT

BOTH

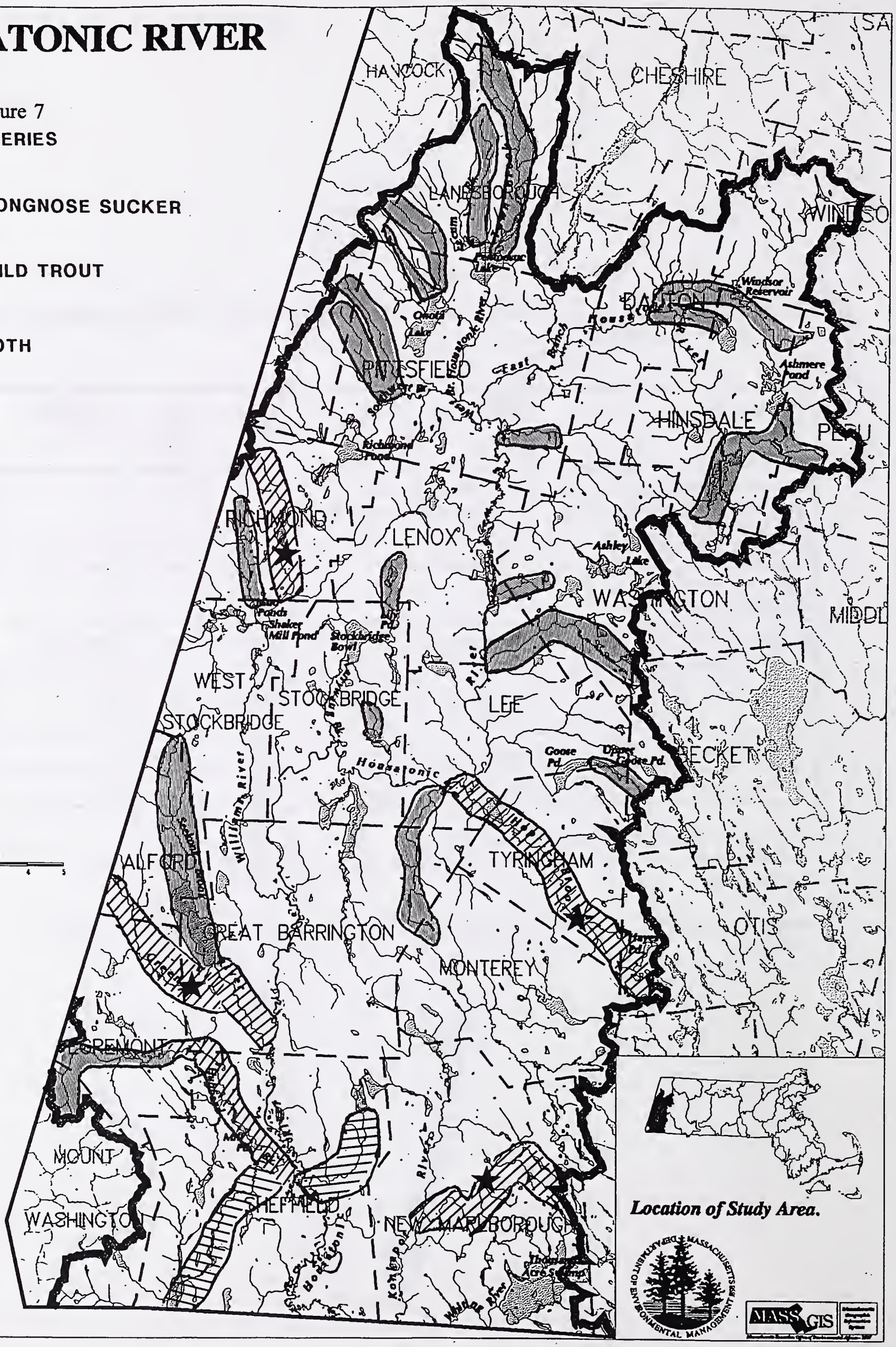

Table 12
Flow Needs
Warm and Cold Water Fisheries
Housatonic River Basin

The Housatonic River and its tributaries have inland fisheries resources ranging from trout to mixed warm/cool water species. Pursuant to notices posted by the Department of Public Health, fish caught in the Housatonic River must be returned to the river and not eaten due to potential contamination from PCB's. Because fish are returned to the river, the fishery in the mainstem of the Housatonic River has thrived in terms of size. The list of wild trout streams provided below is not complete because all the streams in the basin have not been surveyed. In general, most water bodies in the basin contain warm water fisheries and many also contain trout. There are many additional fisheries resources in the ponds and reservoirs in the Housatonic River basin, however they are not included in this report.

Location	Fishery	Time of Year	Flow (cfsm)
East Branch Housatonic River, Housatonic River and its tributaries	smallmouth bass, largemouth bass, yellow perch, chain pickerel, panfish and northern pike	summer	0.23 - 0.64*
Housatonic River - Lee, Great Barrington, Stockbridge and Sheffield Umpachene River, Ironwork Brook, Hubbard Brook, Schenob Brook, Green River, Cone Brook, Hop Brook	longnose sucker (state species of special concern)	na	na
Umpachene River, Karner Brook, Green River, Seekonk Brook, Cone Brook, Furnace Brook, Marsh Brook, Beartown Brook, West Brook, Hop Brook, Greenwater Brook, Washington Mt. Brook, Felton Brook, Sawmill Brook, Sackett Brook, Wahconah Fall Brook, Cleveland Brook, Bennet Brook, Cady Brook, Lulu Brook, Daniels Brook, Secum Brook, Town Brook, Smith Brook, Jacoby Brook, May Brook	wild trout	summer/fall fall	adequate flow for passage to spawning sites adequate groundwater recharge for spawning 0.27 cfsm**

*Interim optimum instream flow recommended by the U.S. Fish and Wildlife Service, Aquatic Base Flow (ABF)
** The flow for wild trout streams was based on the U.S. Fish and Wildlife Service ABF. The ABF was calculated for the Green River. The streamflow with a base flow (the ground water portion of the streamflow) equivalent to the ABF was estimated. The 0.27 cfsm is the flow with a ground water portion equal to the ABF.
na = Not available

Source - Mass. Division of Fisheries and Wildlife; U.S. Fish and Wildlife Service

HOUSATONIC RIVER BASIN

Figure 8

▲ LICENSED HYDROPOWER

● WASTEWATER DISCHARGES

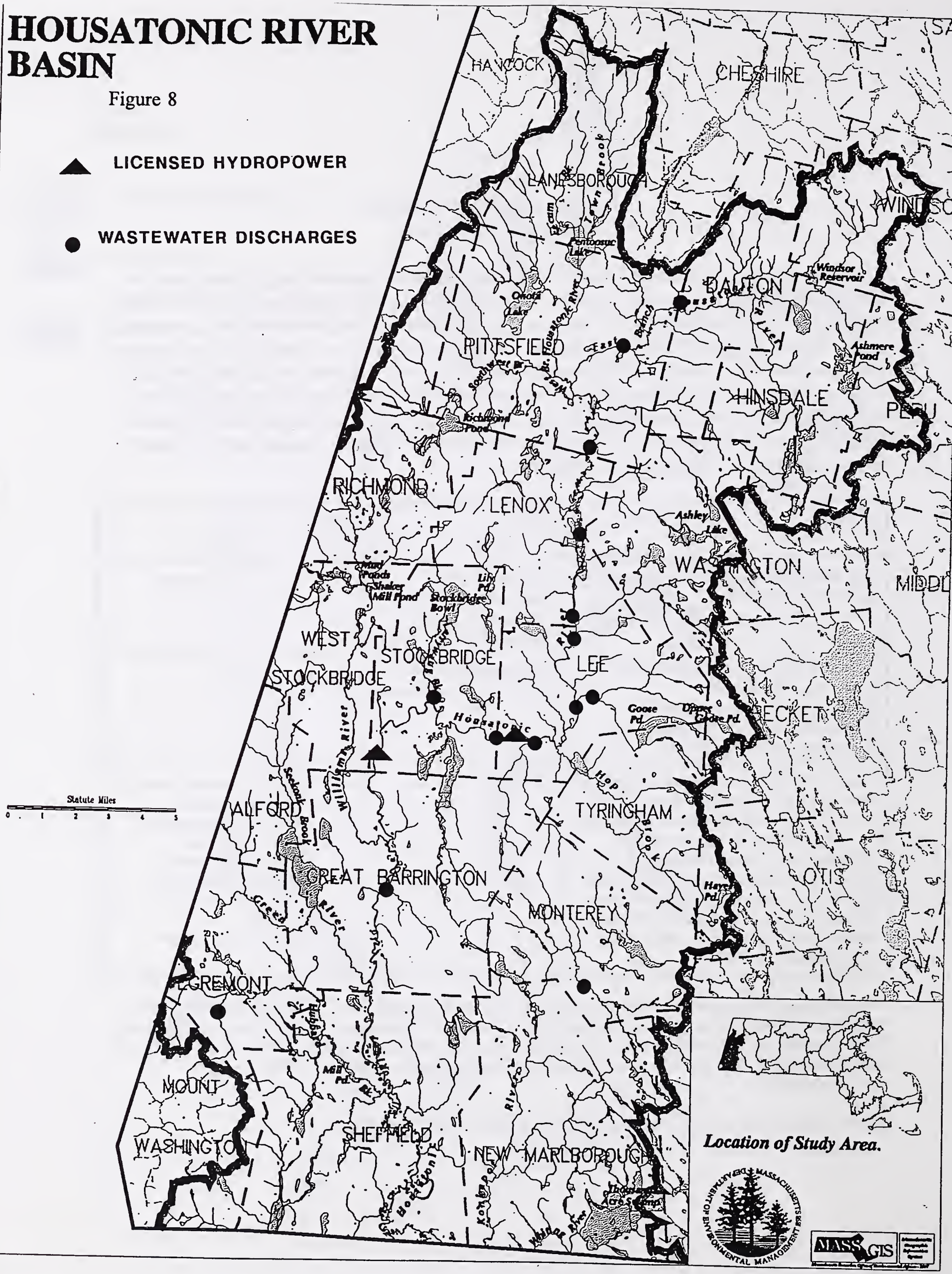

Table 13
Flow Needs
Wastewater Dilution
Housatonic River Basin

There are 11 permitted wastewater discharges to the East Branch and Housatonic River mainstem. DEP requires that discharges meet water quality standards at the 7Q10 flow. The 7Q10 flow is the lowest flow recurring on average every ten years for 7 consecutive days. 7Q10 flows in the Housatonic River basin range from 0.17 cfsm to 0.244 cfsm.

Location	Discharge	Time of Year	7Q10 Flow (cfsm)
East Branch Housatonic River, Dalton	Crane Paper	year round	0.20
Housatonic River, Pittsfield	General Electric	year round	0.244
Housatonic River, Pittsfield	Pittsfield Wastewater Treatment Facility	year round	0.18
Housatonic River, Lenox	Lenox Wastewater Treatment Plant	year round	0.20
Housatonic River, Lee	Schweitzer-Mauduit	year round	0.20
Housatonic River, Lee	Lee Wastewater Treatment Plant	year round	0.20
Housatonic River, Lee	Mead Paper Company - Laurel Mill	year round	0.17
Housatonic River, Lee	Mead Paper Company - Willow Mill	year round	0.17
Housatonic River, Stockbridge	Stockbridge Wastewater Treatment Facility	year round	0.17
Housatonic River, Great Barrington	Great Barrington Wastewater Treatment Facility	year round	0.17
Goose Pond Brook, Lee	Westfield River Paper Co.	year round	0.20
Rawson Brook, Monterey	Gould Farm Wastewater Treatment Facility	year round	na
Fenton Brook, Egremont	Jug End Wastewater Treatment Facility	year round	na

na = Not available
Source - DEP Division of Water Pollution Control; EPA

See Figure 8

Hydropower Map combined with Wastewater Map

Table 14
Flow Needs
Hydropower
Housatonic River Basin

Federally licensed hydropower facilities on the Housatonic River or its tributaries which are required to maintain an instream flow or release a flow to the river are listed below with their flow requirements.

Location	Capacity in kilowatts	Time of Year	Flow (cfsm)
Glendale project - Housatonic River, West Stockbridge	640	year round	0.035 (10 cfs)
Willow Mill Project - Housatonic River, Lee	620	year round	0.01 (1.4 cfs)

Source - Mass. DPU, Energy Facilities Siting Council; U.S. Federal Energy Regulatory Commission

HOUSATONIC RIVER BASIN

Figure 9

WETLANDS

REGIONALLY SIGNIFICANT WETLANDS

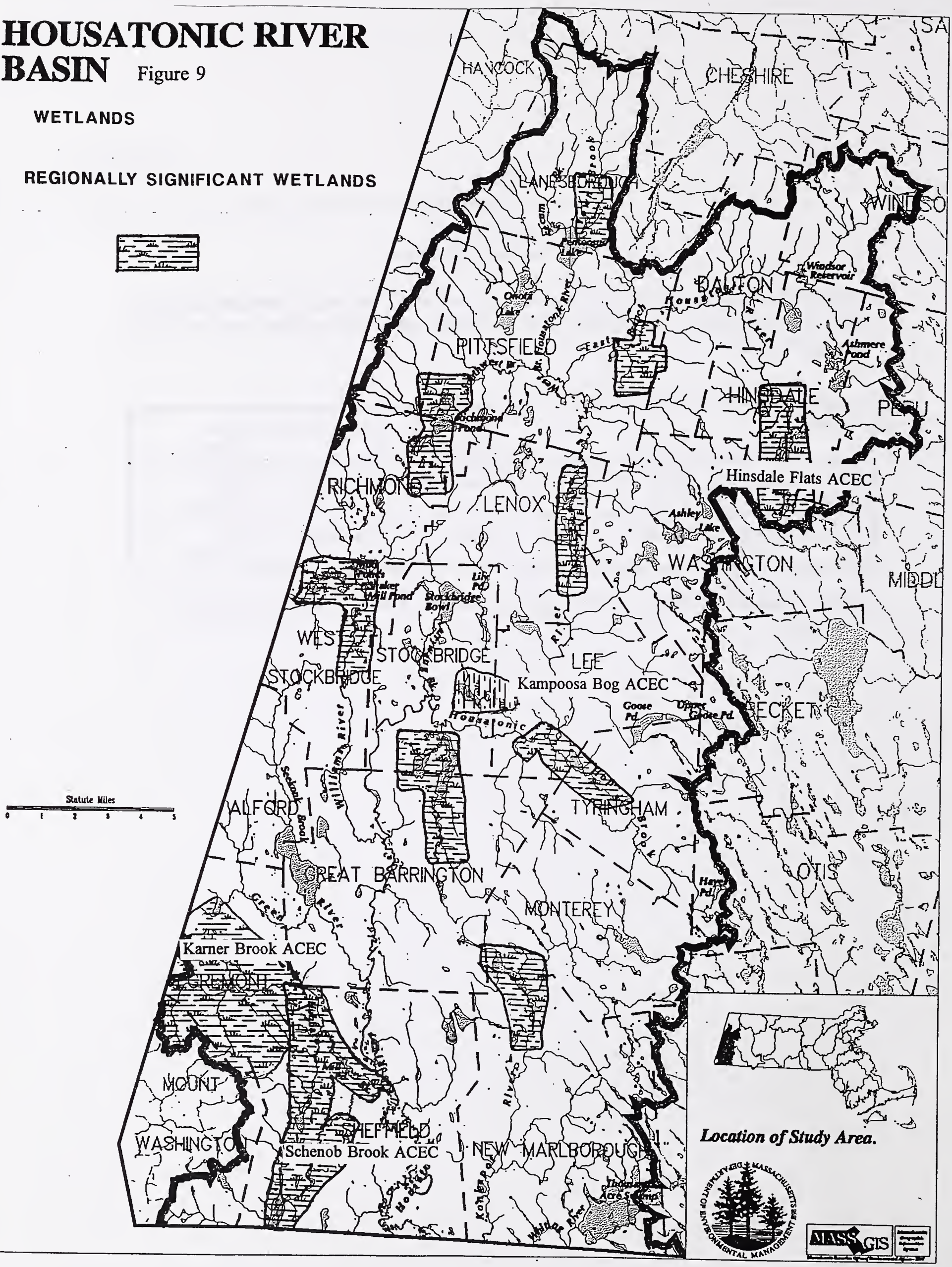

Table 15
Flow Needs
Wetlands and ACEC's
Housatonic River Basin

There are 11 regionally significant wetlands in the Housatonic River Basin, and some of these wetlands have been designated as Areas of Critical Environmental Concern. No flow information is available regarding the flows required to protect and maintain wetland areas. In general, wetland areas need some amount of flooding to saturate them completely and provide recharge which is stored and slowly released. The duration and level of flooding required for healthy wetlands is unknown without further study. In addition, on the Main Stem and East Branch, the flooding necessary to saturate the wetlands could have the negative effect of entraining and depositing PCB contaminated sediments. Therefore it is not possible to determine the best flow scenario to provide water for wetlands at this time.

Location	Size in acres	Time of Year	Flow
East Branch Housatonic River - Hinsdale and Washington part of Hinsdale Flats ACEC - 14,500 acres	880	spring	na
Town Brook - Lanesborough	170	spring	na
Brattle Brook and adjacent Housatonic River - Pittsfield	680	spring	na
Southwest Branch Housatonic River and Richmond Pond - Pittsfield, Richmond	880	spring	na
Woods Pond - Lee, Lenox	920	spring	na
Hop Brook and Housatonic River - Lee, Tyringham	540	spring	na
Agawam and Konkapot Brooks - Stockbridge, Great Barrington	1,250	spring	na
Flat Brook and Williams River - West Stockbridge	540	spring	na
Konkapot River - New Marlborough	160	spring	na
Schenob Brook - Sheffield part of Schenob Brook Drainage Basin ACEC - 13,750 acres	1,620	spring	na
Hubbard Brook - Sheffield	690	spring	na
Karner Brook Watershed ACEC - 7,000 acres - Egremont and Mount Washington	na	na	na

na = Not available

Sources - U.S. Natural Resources Conservation Service;
Mass. DEM, ACEC program

HOUSATONIC RIVER BASIN Figure 10

Public Water Supply Locations

▲ Groundwater Source

◉ Surfacewater Source

— Subbasin Boundary

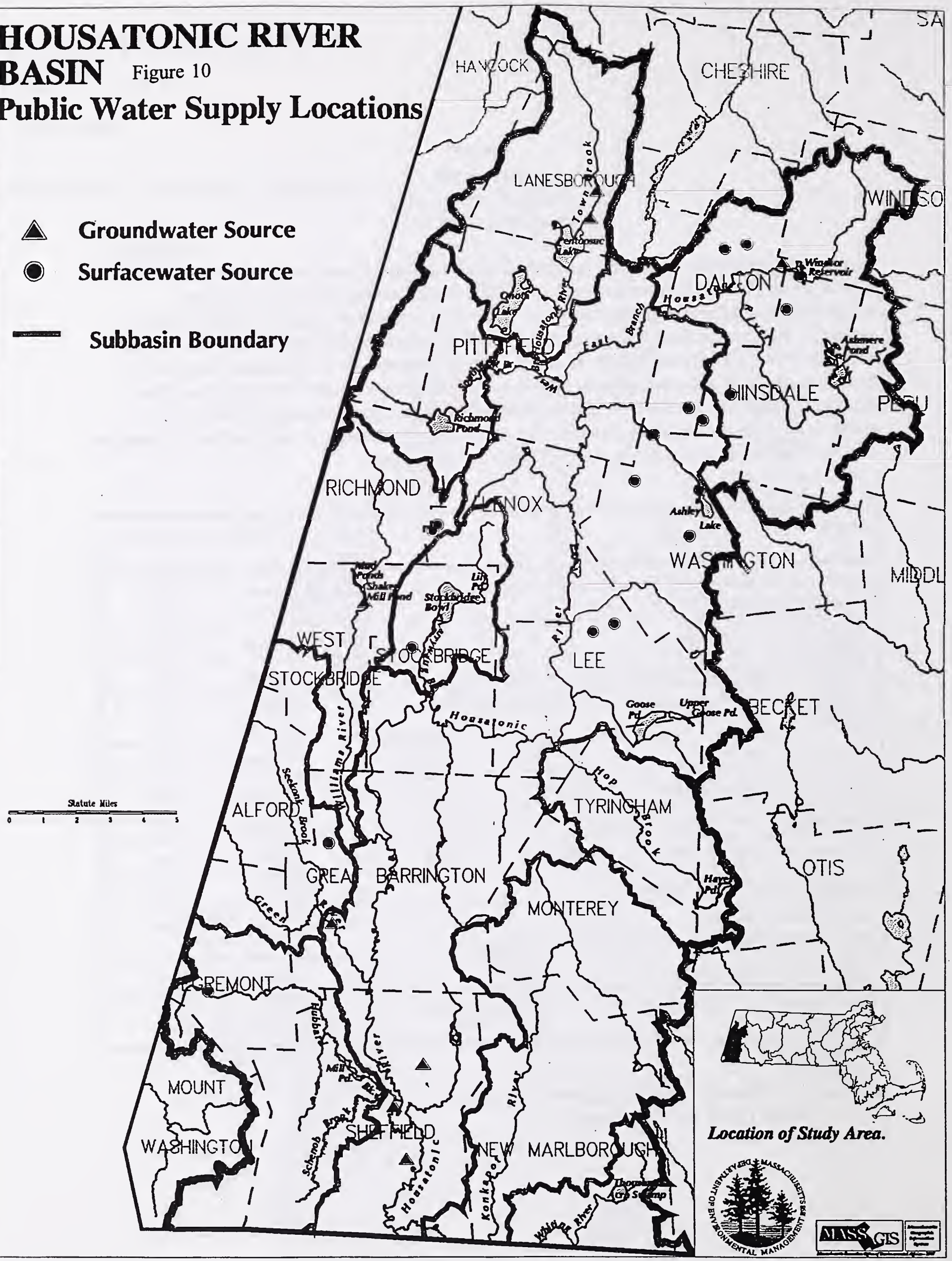

Table 16
Flow Needs
Water Supply
Housatonic River Basin

There are no public water supply withdrawals from the Housatonic River, however the Egremont Water Department withdraws water directly from Karner Brook and eight communities get their water from reservoirs which would normally discharge to the streams below their impoundment. Below is a summary of all the reservoirs and the streams which they would normally discharge to. There are currently no required minimum releases to these streams.

Reservoir (location, if different from the community being supplied)	Community Water Supply	River	Minimum Release Required
Egypt Reservoir	Dalton	unnamed tributary to Wahconah Falls Brook	none
Windsor Reservoir (Windsor & Hinsdale)	Dalton	Wahconah Falls Brook	none
Cleveland Reservoir (Hinsdale)	Pittsfield	Cleveland Brook	none
Sackett Reservoir (Hinsdale)	Pittsfield	Sackett Brook	none
Lower Ashley Reservoir (Dalton)	Pittsfield	Ashley Brook	none
Ashley Reservoir (Washington)	Pittsfield	Ashley Brook	none
Farnham Reservoir (Washington)	Pittsfield	unnamed tributary to Mill Brook	none
Sandwich Reservoir (Washington)	Pittsfield	Roaring Brook	none
Belmont Reservoir	Hinsdale	unnamed stream flowing from Belmont Reservoir to Plunkett Reservoir	none
Upper and Lower Root Reservoirs	Lenox	Lenox Mtn. Brook	none
Leahy Reservoir	Lee	Codding Brook	none
Vanetti Reservoir	Lee	Codding Brook	none
Long Pond	Great Barrington	Long Pond Brook	none

Source - DEM

Streamflow Summary

Table 17
Summary of Flow Data
Housatonic River Basin

Location	Water Use	Time	Flow (cfsm)
Upper Housatonic River and East Branch Housatonic River	canoeing	spring	0.35
Lower Housatonic River	canoeing	summer	0.46
Housatonic River and tributaries	warm water fisheries	summer	0.64
Tributaries to Housatonic River	wild trout	summer/ fall	0.27
East Branch Housatonic River	wastewater dilution	year round	0.20
Housatonic River and tributaries	wastewater dilution	year round	0.17 - 0.244
Housatonic River	hydropower	year round	0.01 - 0.035
Housatonic River and tributaries	wetlands	spring	na
Tributaries to Housatonic River	water supply	year round	none
Williams River	canoeing	spring	0.21
Green River	canoeing	spring	0.37
Konkapot River	canoeing	spring	0.20

The information in the above table summarizes the flow data for the water uses in the Housatonic River Basin. Flow needs for the Housatonic River and its tributaries range from 0.01 cfsm to 0.64 cfsm during the summer, however most flows fall in the range of 0.20 cfsm to 0.46 cfsm. Flow needs for the Williams, Green and Konkapot Rivers range from 0.20 cfsm to 0.64 cfsm. Flow needs for the upper Housatonic River and East Branch Housatonic River are 0.35 cfsm in the spring, however this number does not include flow needs for wetlands, which would be much higher.

The following graphs illustrate the flow needs with respect to the streamflow on the Housatonic River at Great Barrington. Figure 11 shows the flow needs with respect to the average monthly flow over the period of record. These flows exceed all the flow needs. Figure 12 shows the flow needs with respect to monthly flow in a dry year (1995) and Figure 13 shows the flow needs with respect to the daily flow in August of a dry year (1995). In a dry year, flows may not be naturally available to meet all needs.

Figure 11

Housatonic River at Great Barrington
Period of Record Monthly Flow in cfsm

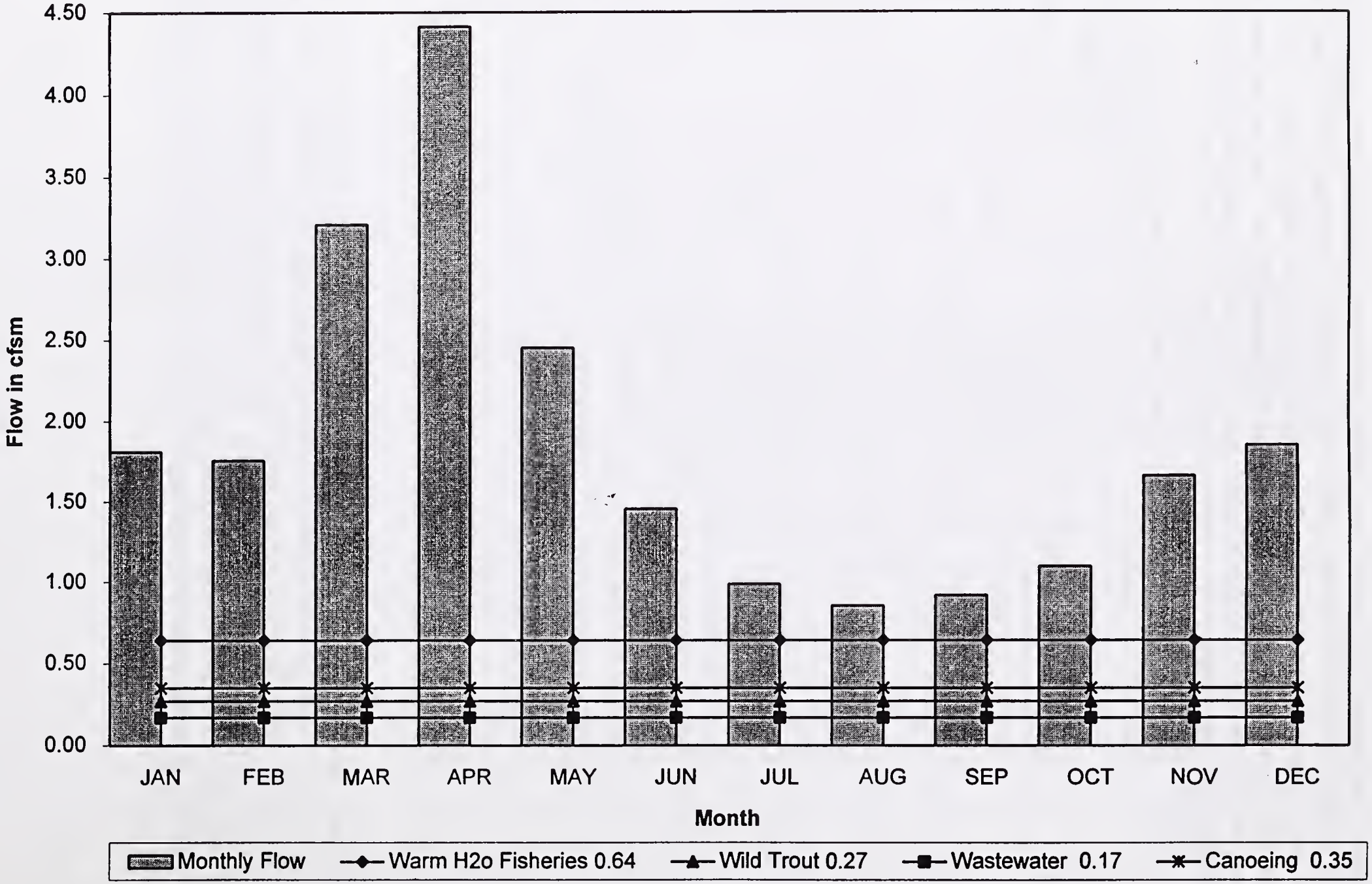

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Figure 12

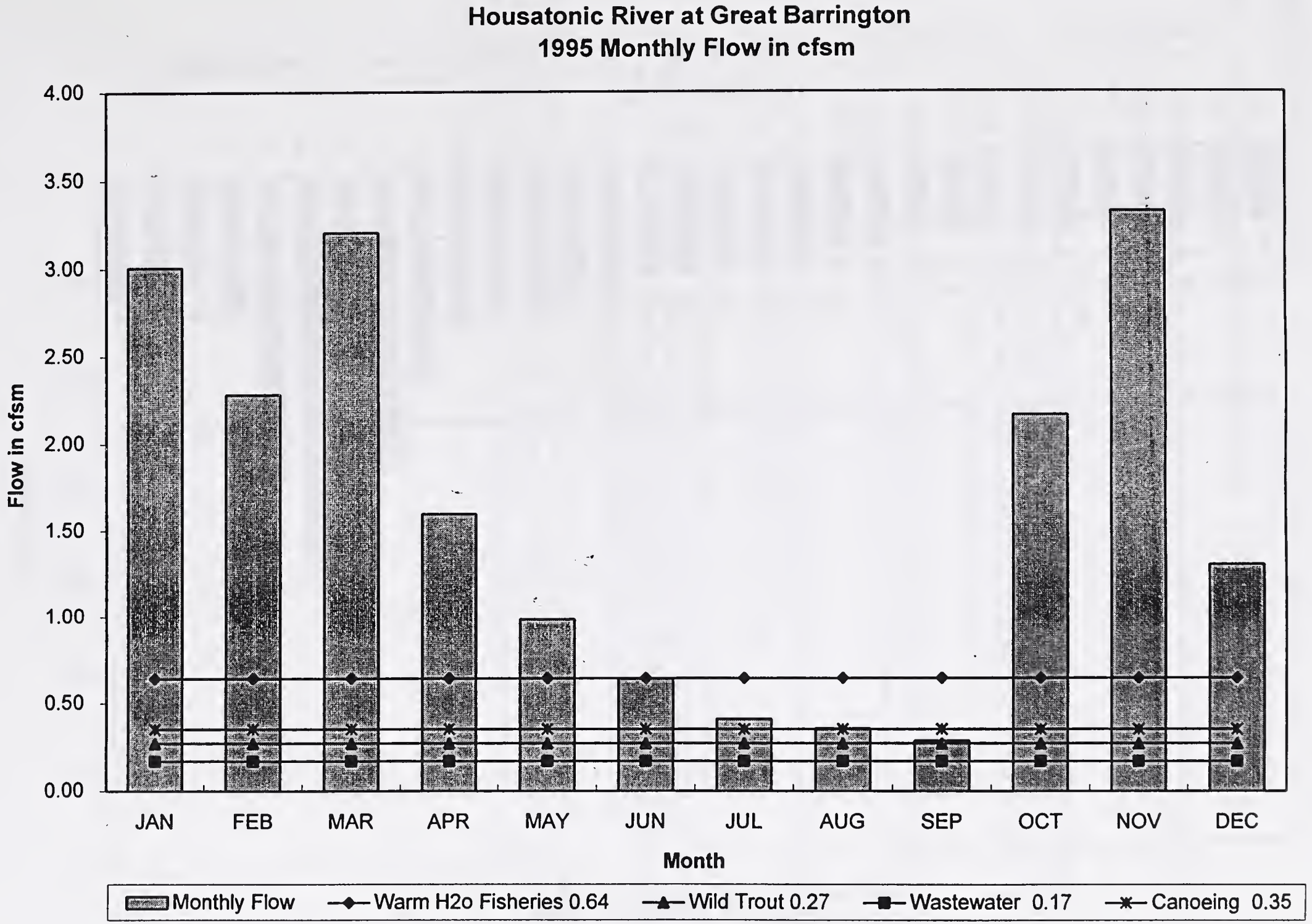

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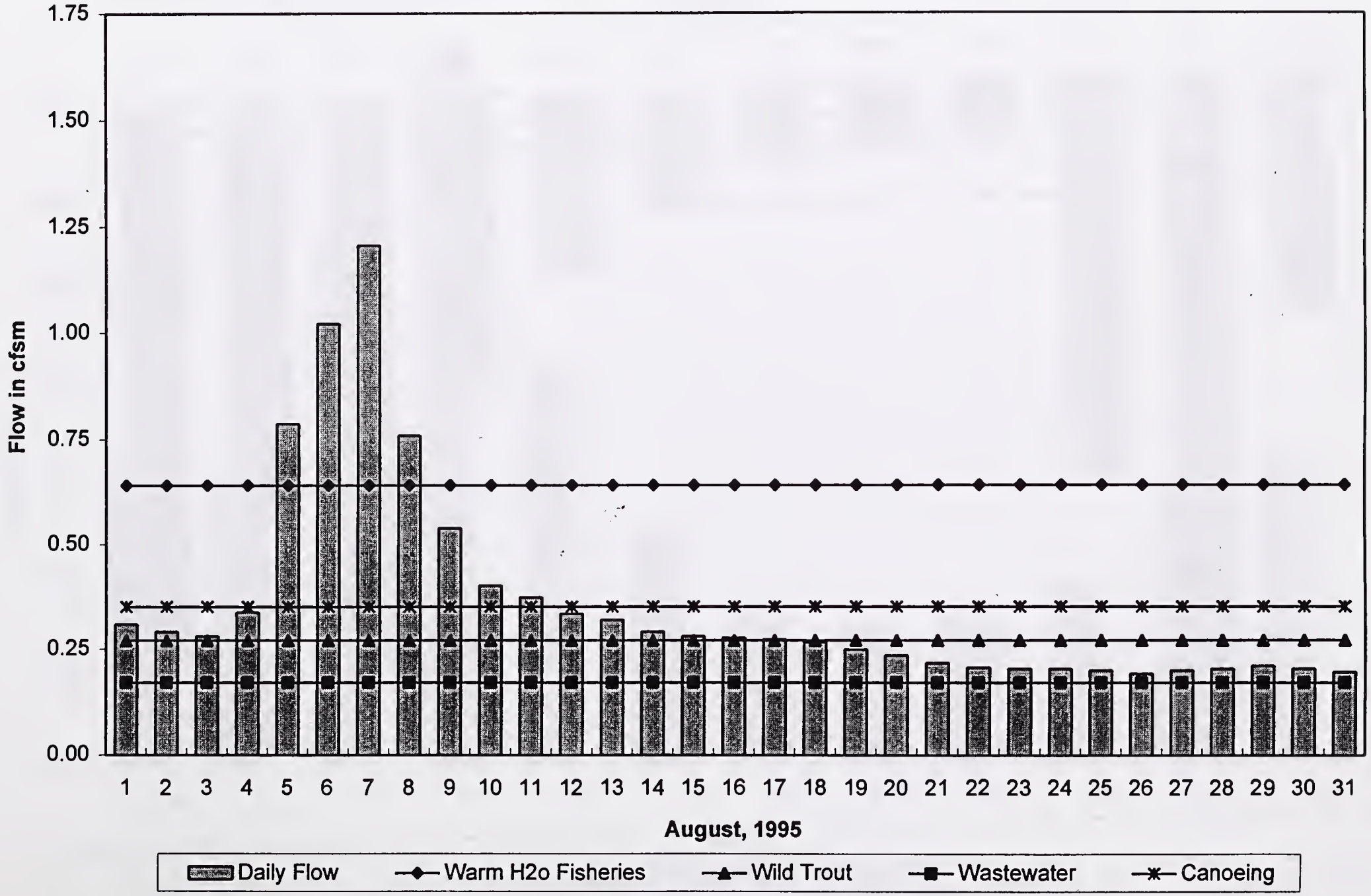
Figure 13

Housatonic River at Great Barrington
August 1995 Daily Flow in cfsm



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Streamflow Recommendations

Based on the data collected several recommendations can be made:

1. A flow of 0.64 cfsm is the amount of water that should be left instream during an average summer month. This flow should be used when evaluating projects which have the capacity to significantly affect the river such as large diversions or reservoirs.

2. Although there is no information available to determine an adequate spring streamflow which would sufficiently saturate wetlands and maintain the channel of the river without inducing transport of PCB-contaminated sediments, the impacts of projects which could change the seasonal streamflow variation should be evaluated.

3. A minimum streamflow threshold between 0.20 cfsm and 0.46 cfsm should be used to conserve flows during low flow periods by regulating withdrawals through demand management.

4. Ground water withdrawals in subbasins containing wild trout streams should be carefully evaluated with respect to their effect on a flow of 0.27 cfsm.

5. A downstream flow release from water supply reservoirs with aquatic stream habitat should be established. A summary of the reservoirs for which flows could be established can be found in the DEP report: 1992 Housatonic River Tributary Biomonitoring Survey, Assessing Instream Impacts to Biota From Surface Water Supply Withdrawals.

The streamflow threshold numbers recommended for the Housatonic River basin should not be considered optimum year-round flows for the river. A healthy environment is dependent on naturally varying streamflow levels. It is the intention of the basin plans that this naturally variability be maintained.

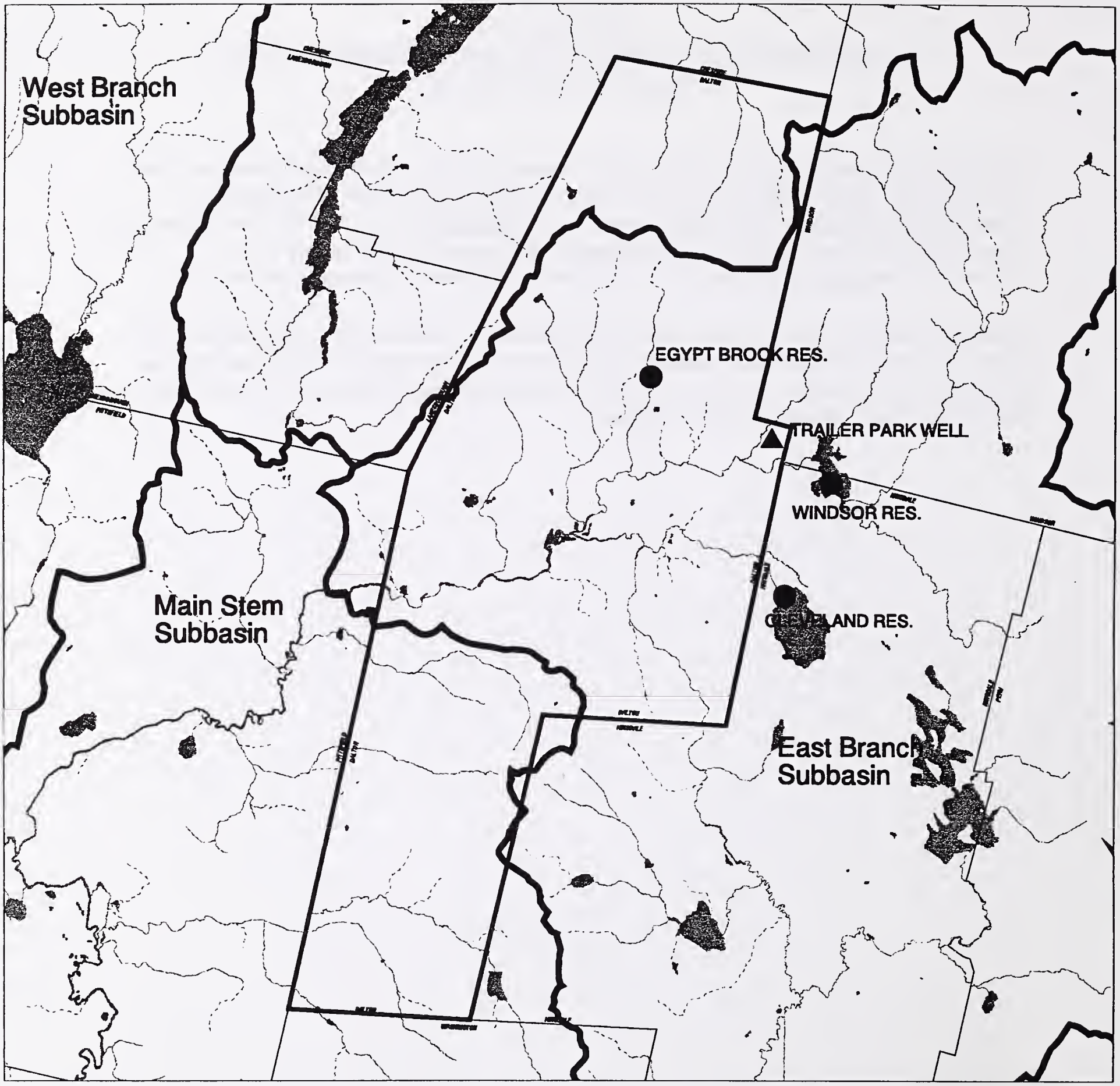
APPENDIX A
WATER CONSERVATION PRACTICES AND RECOMMENDATIONS
PUBLIC WATER SUPPLIES

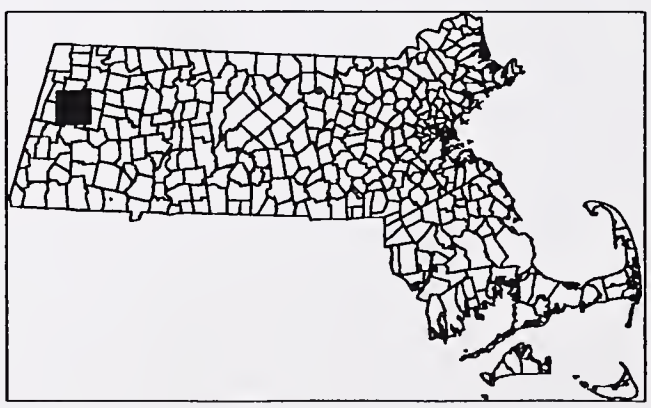
The following maps show the location of each community's public water supply sources. The accompanying tables describe how closely towns and water suppliers are adhering to the Conservation Standards for the Commonwealth of Massachusetts (WRC 1992). The information is used in the development of DEP Water Management Act permits and is helpful to communities seeking to improve water supply system efficiency and end-user conservation.

Please note that information in these tables is preliminary. It was obtained from responses to a water conservation questionnaire and from discussions with water suppliers. The tables do not reflect full water conservation plans to be developed as part of applications to DEP for Water Management Act permit or for other purposes.

Figure A 1

Dalton





N
W E
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2000 0 2000 4000 Feet

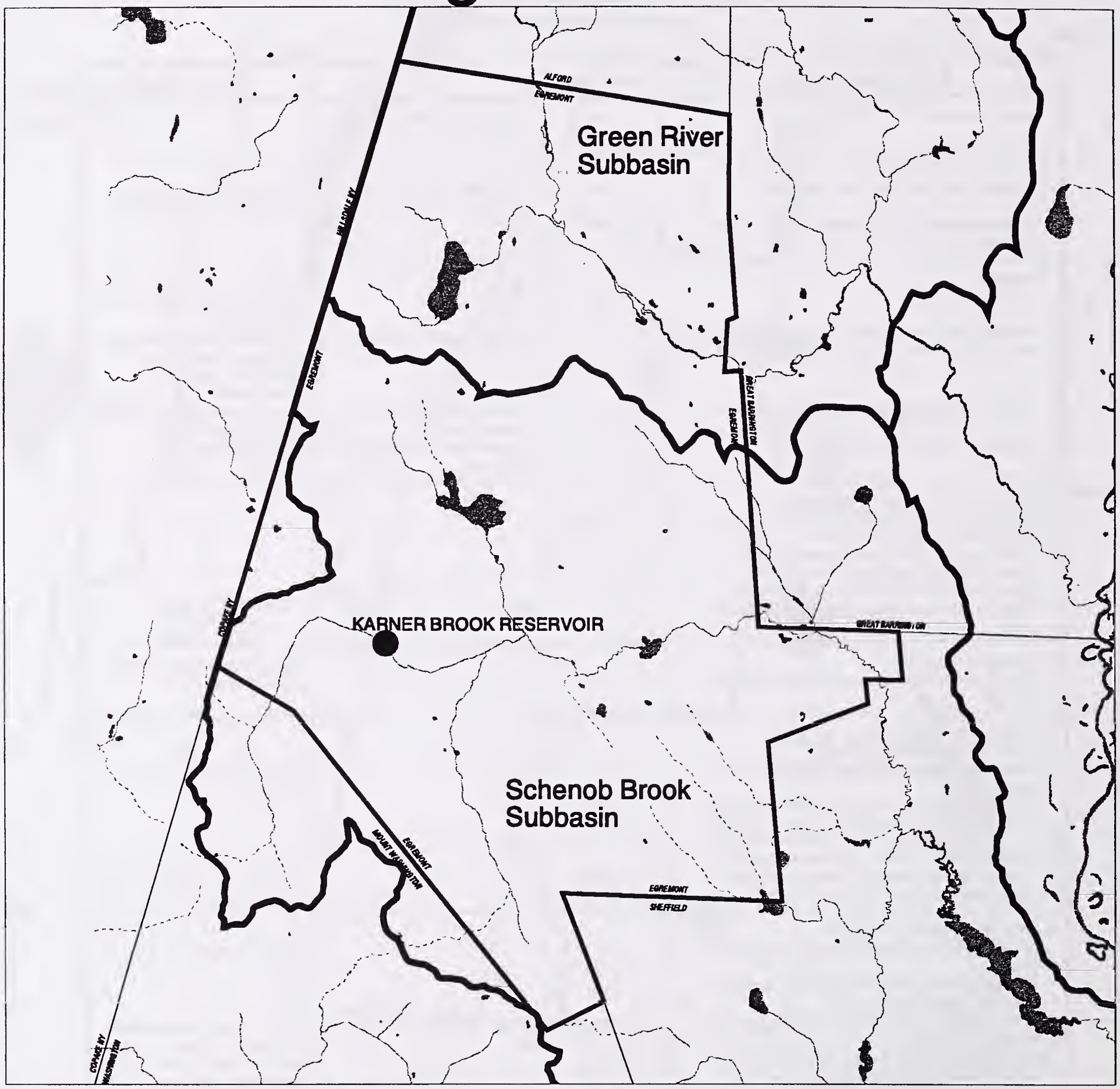
Community Ground Water
Community Surface Water
Surface Water
Stream
Intermittent Stream
Watershed Subbasin
Towns

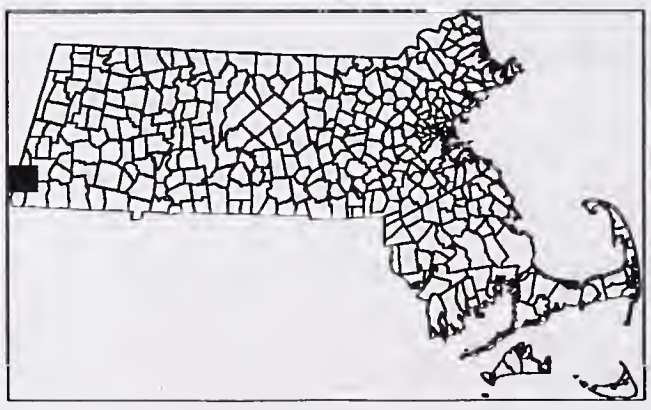
Table A-1
Water Conservation/System Efficiency Status
DALTON FIRE DISTRICT

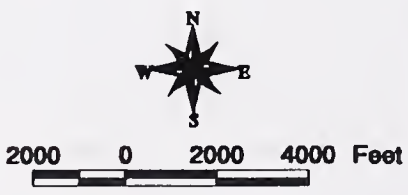
Conservation Standard	Standard Met?	Notes	Recommendations
1. Public Education	Yes	Biannual newsletter with conservation information	
2. Leak Detection and Repair			
- Full leak detection survey every two years	No	Leak detection survey has not been done in 15 years	Implement a program to check for leaks every two years
- Leak detection and repair included in water system pricing structure	Yes		
3. Metering			
- 100% metered	No	5% metered	Implement a program to meter all customers
- Metering program that includes regular maintenance and testing, calibration, repair and replacement	No	Meters checked for tampering only	Implement a program of regular maintenance and testing, calibration, repair and replacement
- Domestic meter reading and billing 4 times a year	No	The Fire District does not have domestic meters	Install residential meters; read and bill 4 times a year
- Master meters calibrated annually	No	Master meter calibrated every two years	Calibrate master meters annually
4. Pricing			
- Water pricing structure should include the full-cost of operating the water supply system	Yes		
- Water supply system operations should be fully funded by water supply system revenues	Yes		
- Rate structures should be regularly be evaluated	Yes		
- Consider pricing options, such as increasing block rate	No	Flat rate	
5. Residential Water Use			
- Water supplier should make available water saving devices	No		Make water saving available to residential customers
6. Public Sector Water Use			
- Public buildings should be metered	Yes		
- Public buildings should be retrofitted with water saving devices	No		Retrofit public buildings with water saving devices
- Fire hydrants used by contractors should be metered	No		
- Automatic water sprinklers used at public buildings	No		
7. Industrial, Commercial and Institutional Water Use			
- These users should develop a written water policy	Unknown		Work with industrial customers to develop a written water policy and carry out a water audit
- These users should carry out a water audit	Unknown		
8. Water Supply System Management			
- Water supplier should have a drought emergency plan	No		Develop a drought emergency plan
- Water supplier should develop strategies to reduce daily and seasonal peak demands	Yes		
- Water supplier should carry out water supply system audit every 3-5 years	No	Master Meter usage checked daily	Carry out water supply system audit every 3-5 years
- Water supplier should develop plan to identify all users of water, both metered and unmetered; and how much water is unaccounted for	No		Identify all users of water, both metered and unmetered; Determine amount of unaccounted-for water

Figure A 2

Egremont







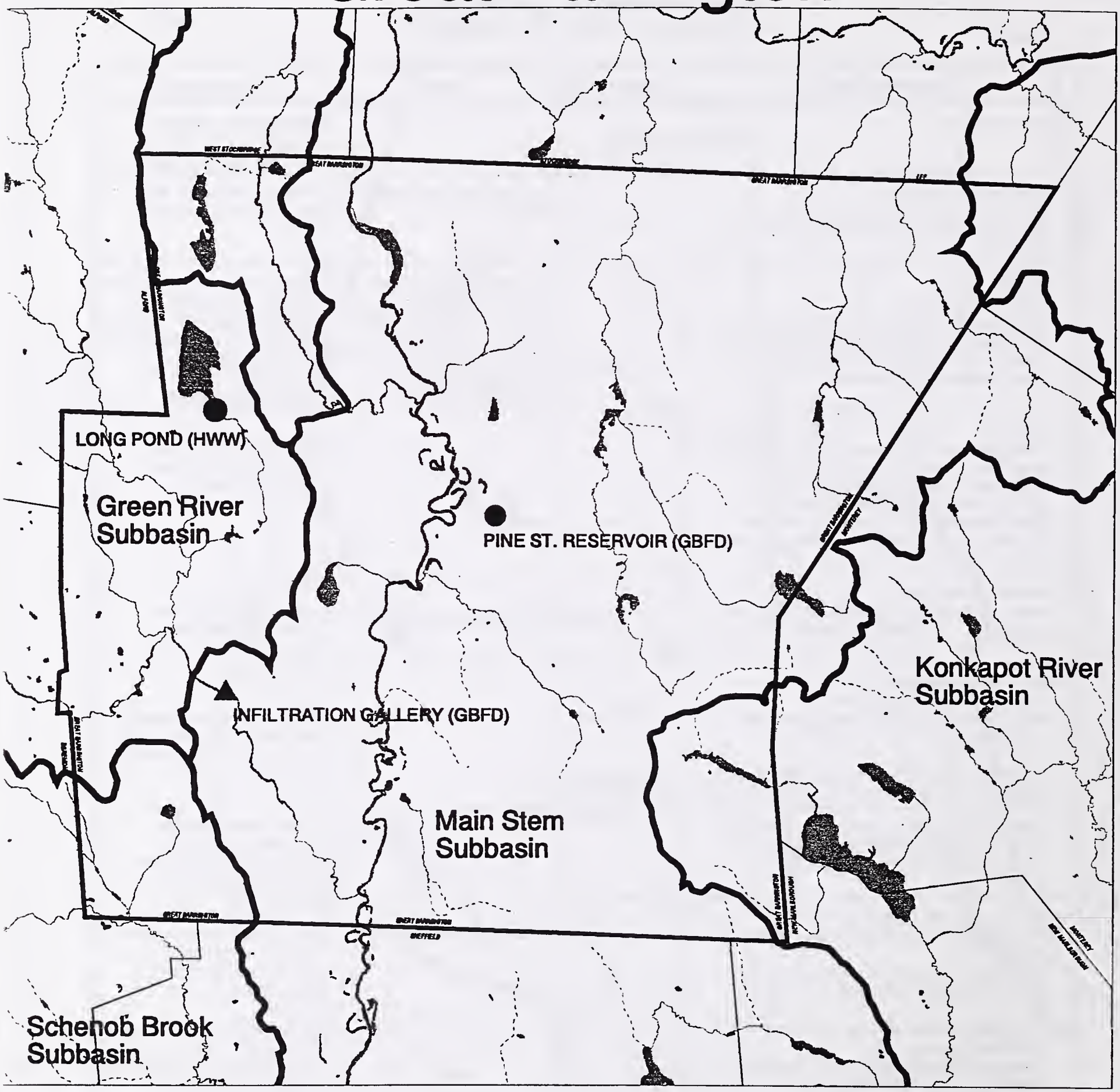
- Community Ground Water
- Community Surface Water
- Surface Water
- Stream
- Intermittent Stream
- Watershed Subbasin
- Towns

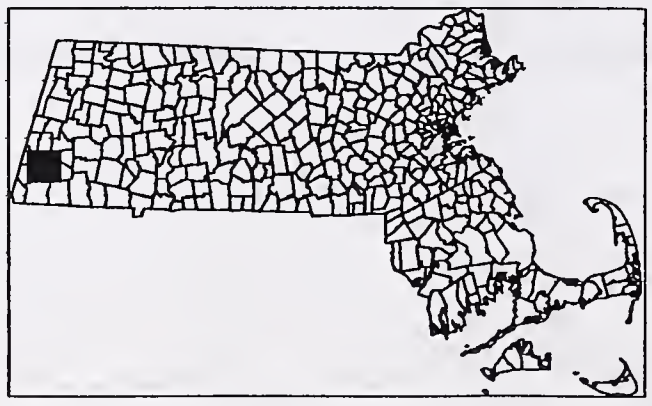
Table A-2
Water Conservation/System Efficiency Status
EGREMONT WATER DEPARTMENT

Conservation Standard	Standard Met?	Notes	Recommendations
1. Public Education	No		Institute public education program in accordance with 1992 Conservation Standards
2. Leak Detection and Repair - Full leak detection survey every two years - Leak detection and repair included in water system pricing structure	 Yes Yes	Leak detection survey currently in progress	Continue with regular leak detection surveys every two years
3. Metering - 100% metered - Metering program that includes regular maintenance and testing, calibration, repair and replacement - Domestic meter reading and billing 4 times a year - Master meters calibrated annually	 No No No No	The town recently acquired private water company. It is in the process of upgrading the system. There are plans to meter all users, but at this point there is no timetable for completion of the project.	Continue to work towards 100% metering of the system. Implement program to regularly maintain, test, calibration, repair and replace meters in accordance with 1992 Conservation Standards
4. Pricing - Water pricing structure should include the full-cost of operating the water supply system - Water supply system operations should be fully funded by water supply system revenues - Rate structures should be regularly be evaluated - Consider pricing options, such as increasing block rate	 Yes No No	 See above	Establish a pricing system which will fully fund water system operations.
5. Residential Water Use - Water supplier should make available water saving devices	No		Make water saving devices available to residential customers
6. Public Sector Water Use - Public buildings should be metered - Public buildings should be retrofitted with water saving devices - Fire hydrants used by contractors should be metered - Automatic water sprinklers used at public buildings	 Yes Unknown Not applicable No		Determine if public buildings have been retrofit with water saving devices; if not, provide
7. Industrial, Commercial and Institutional Water Use - These users should develop a written water policy - These users should carry out a water audit			Work with industrial and commercial users, where applicable, to develop water conservation policy
8. Water Supply System Management - Water supplier should have a drought emergency plan - Water supplier should develop strategies to reduce daily and seasonal peak demands - Water supplier should carry out water supply system audit every 3-5 years - Water supplier should develop plan to identify all users of water, both metered and unmetered; and how much water is unaccounted for		Plan is under development	Submit plan, when completed, to DEP for approval Develop strategies to reduce daily and seasonal peak demands Carry out water supply system audit every 3-5 years Identify all users of water, both metered and unmetered; Determine amount of unaccounted-for water

Figure A 3

Great Barrington





2000 0 2000 4000 Feet

- Community Ground Water
- Community Surface Water
- Surface Water
- Stream
- Intermittent Stream
- Watershed Subbasin
- Towns

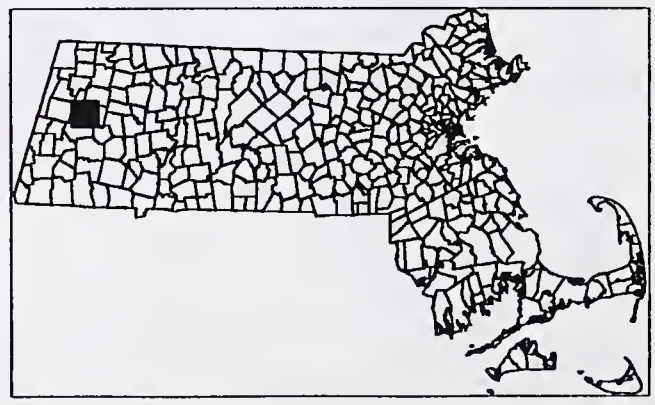
HWW = Housatonic Water Works
GBFD = Great Barrington Fire Department

Table A-3
Water Conservation/System Efficiency Status
GREAT BARRINGTON FIRE DISTRICT

Conservation Standard	Standard Met?	Notes	Recommendations
1. Public Education	No		Institute public education program in accordance with 1992 Conservation Standards
2. Leak Detection and Repair			
- Full leak detection survey every two years	Yes		
- Leak detection and repair included in water system pricing structure	No		Determine method to include leak detection as a regular budget item
3. Metering			
- 100% metered	Yes		
- Metering program that includes regular maintenance and testing, calibration, repair and replacement	Yes		
- Domestic meter reading and billing 4 times a year	Yes		
- Master meters calibrated annually	Unknown		Institute program to calibrate master meters annually
4. Pricing			
- Water pricing structure should include the full-cost of operating the water supply system	Yes		
- Water supply system operations should be fully funded by water supply system revenues	No		Evaluate advantages and disadvantages of being fully funded by water supply system revenues
- Rate structures should be regularly be evaluated	Yes		
- Consider pricing options, such as increasing block rate	Yes	Increasing block rate	
5. Residential Water Use			
- Water supplier should make available water saving devices	No		Make water saving devices available to residential customers
6. Public Sector Water Use			
- Public buildings should be metered	Yes		
- Public buildings should be retrofitted with water saving devices	Yes		
- Fire hydrants used by contractors should be metered	No		
- Automatic water sprinklers used at public buildings	No		
7. Industrial, Commercial and Institutional Water Use			
- These users should develop a written water policy	Unknown		Work with industrial and commercial users, where applicable, to develop water conservation policy
- These users should carry out a water audit	Unknown		
8. Water Supply System Management			
- Water supplier should have a drought emergency plan	Yes		
- Water supplier should develop strategies to reduce daily and seasonal peak demands	Yes		
- Water supplier should carry out water supply system audit every 3-5 years	Yes	Yearly water audit	
- Water supplier should develop plan to identify all users of water, both metered and unmetered; and how much water is unaccounted for	No	No estimates of unaccounted-for water	Identify all users of water, both metered and unmetered; Determine amount of unaccounted-for water

Figure A 4

Hinsdale



2000 0 2000 4000 Feet

- Community Ground Water
- Community Surface Water
- Surface Water
- Stream
- Intermittent Stream
- Watershed Subbasin
- Towns

Table A-4
Water Conservation/System Efficiency Status
HINSDALE PUBLIC WATER SUPPLY

Conservation Standard	Standard Met?	Notes	Recommendations
1. Public Education	Yes	Bill Stuffers, radio and newspaper ads	
2. Leak Detection and Repair - Full leak detection survey every two years	No	Leak Detection Survey conducted every 5-10 years	The town has just completed a rehabilitation program for its water supply system; frequency of leak detection should be reevaluated in a few years
- Leak detection and repair included in water system pricing structure	Yes		
3. Metering - 100% metered	Yes		
- Metering program that includes regular maintenance and testing, calibration, repair and replacement	Yes	Town is in process of meter replacement program	Continue with replacement program
- Domestic meter reading and billing 4 times a year	No	Customers billed twice per year	Evaluate increasing frequency of billing
- Master meters calibrated annually	-	Calibration frequency to be established in the course of the meter replacement program	Institute an annual program to calibrate master meters
4. Pricing - Water pricing structure should include the full-cost of operating the water supply system	Yes		
- Water supply system operations should be fully funded by water supply system revenues	Yes		
- Rate structures should be regularly be evaluated	Yes		
- Consider pricing options, such as increasing block rate	No	Flat rate	Investigate instituting an increasing block rate price structure
5. Residential Water Use - Water supplier should make available water saving devices	No		Make water saving devices available to residential customers
6. Public Sector Water Use - Public buildings should be metered	Yes		
- Public buildings should be retrofitted with water saving devices	Yes	Low flow toilets only	
- Fire hydrants used by contractors should be metered	Not applicable		
- Automatic water sprinklers used at public buildings	No		
7. Industrial, Commercial and Institutional Water Use - These users should develop a written water policy	Not applicable		
- These users should carry out a water audit	Not applicable		
8. Water Supply System Management - Water supplier should have a drought emergency plan	Yes		
- Water supplier should develop strategies to reduce daily and seasonal peak demands	No		Develop strategies to reduce daily and seasonal peak demands
- Water supplier should carry out water supply system audit every 3-5 years	Yes	Annual water audit	
- Water supplier should develop plan to identify all users of water, both metered and unmetered; and how much water is unaccounted for	No	No estimates of unaccounted-for water	Determine amount of unaccounted-for water

Figure A 5

Great Barrington

LONG POND (HWW)

Green River Subbasin

PINE ST. RESERVOIR (GBFD)

INFILTRATION GALLERY (GBFD)

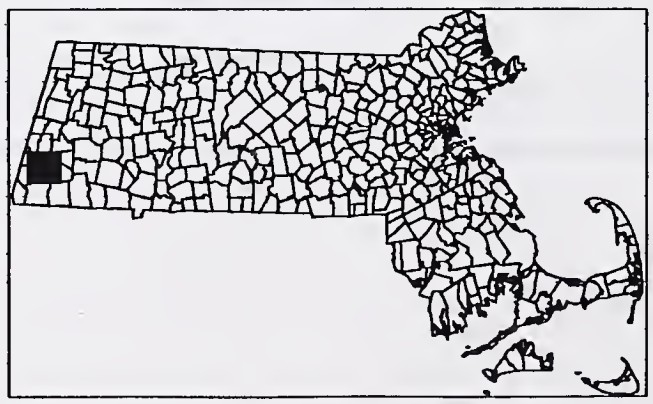
Konkapot River Subbasin

Main Stem Subbasin

Schenob Brook Subbasin

N
W E
S

2000 0 2000 4000 Feet



Community Ground Water
Community Surface Water
Surface Water
Stream
Intermittent Stream
Watershed Subbasin
Towns

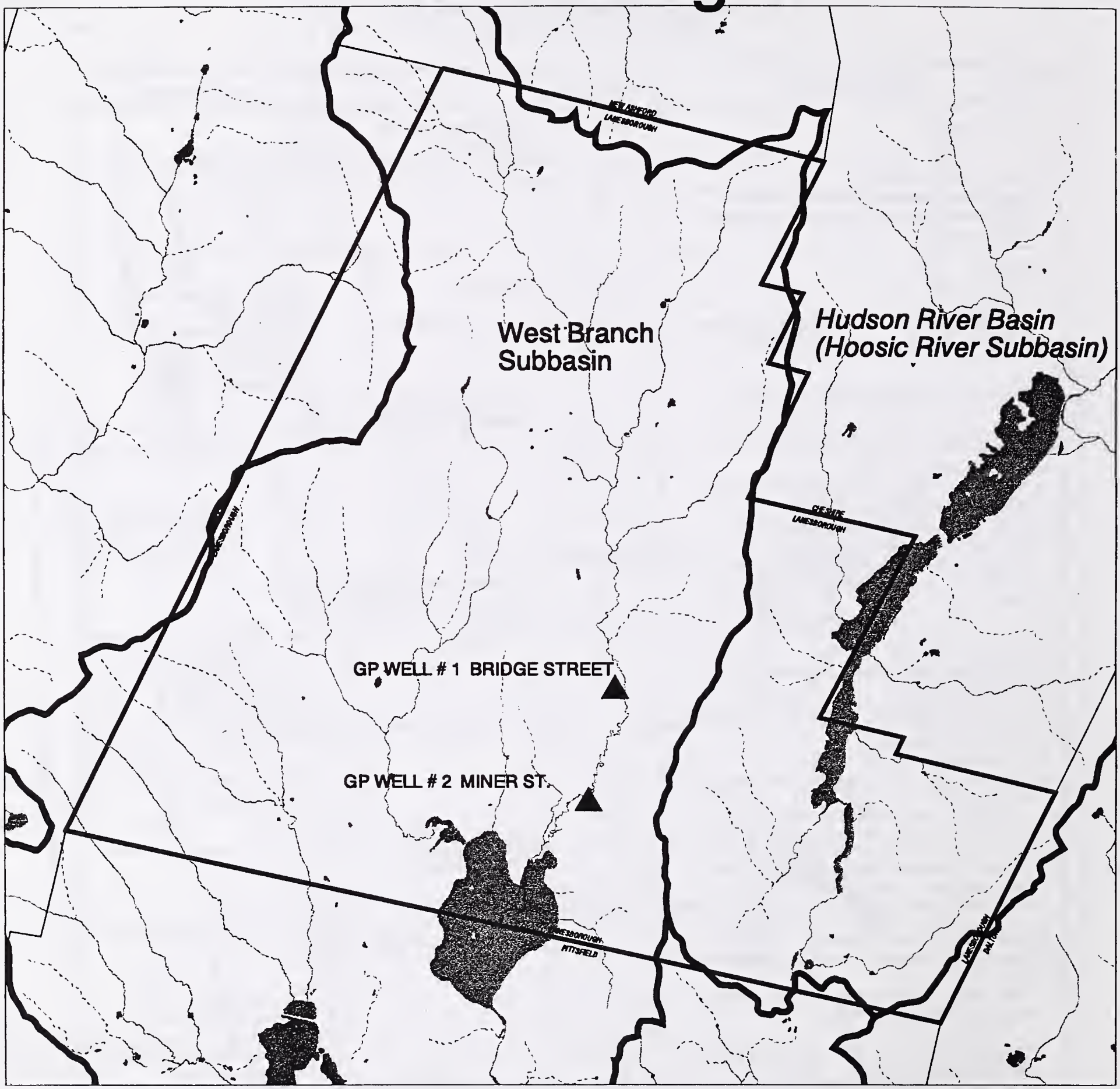
HWW = Housatonic Water Works
GBFD = Great Barrington Fire Department

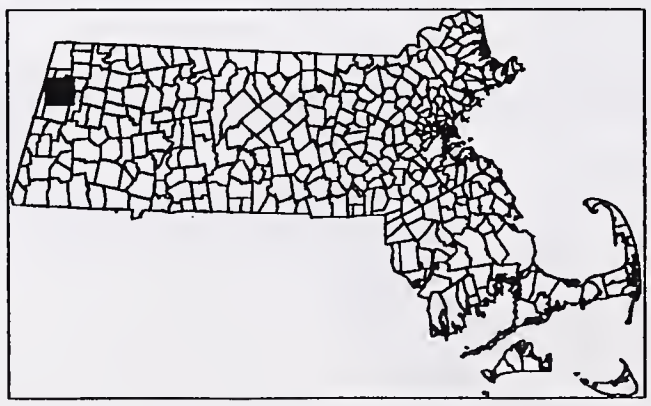
Table A-5
Water Conservation/System Efficiency Status
HOUSATONIC WATER WORKS

Conservation Standard	Standard Met?	Notes	Recommendations
1. Public Education	Yes	Bill Stuffers, radio and newspaper ads	
2. Leak Detection and Repair - Full leak detection survey every two years - Leak detection and repair included in water system pricing structure	 Yes Yes		
3. Metering - 100% metered - Metering program that includes regular maintenance and testing, calibration, repair and replacement - Domestic meter reading and billing 4 times a year 0 - Master meters calibrated annually	 No No Yes Yes	 95% metered Regular repairs to meters Residential customers meters read and billed monthly	 Institute program to achieve 100% metering Implement a program of regular maintenance and testing, calibration, repair and replacement
4. Pricing - Water pricing structure should include the full-cost of operating the water supply system - Water supply system operations should be fully funded by water supply system revenues - Rate structures should be regularly be evaluated - Consider pricing options, such as increasing block rate	 Yes Yes Yes Yes	 Flat rate for first 2,500 gallons; per gallon charge for anything over that	
5. Residential Water Use - Water supplier should make available water saving devices	 No		Make water saving devices available to residential customers
6. Public Sector Water Use - Public buildings should be metered - Public buildings should be retrofitted with water saving devices - Fire hydrants used by contractors should be metered - Automatic water sprinklers used at public buildings	 Yes No No No		 Retrofit public buildings with water saving devices
7. Industrial, Commercial and Institutional Water Use - These users should develop a written water policy - These users should carry out a water audit	 Not applicable Not applicable		
8. Water Supply System Management - Water supplier should have a drought emergency plan - Water supplier should develop strategies to reduce daily and seasonal peak demands - Water supplier should carry out water supply system audit every 3-5 years - Water supplier should develop plan to identify all users of water, both metered and unmetered; and how much water is unaccounted for	 Yes No Unknown No	 No estimates of unaccounted-for water	 Develop strategies to reduce daily and seasonal peak demands Carry out water supply system audit every 3-5 years Identify all users of water, both metered and unmetered; Determine amount of unaccounted-for water

Figure A 6

Lanesborough





2000 0 2000 4000 Feet

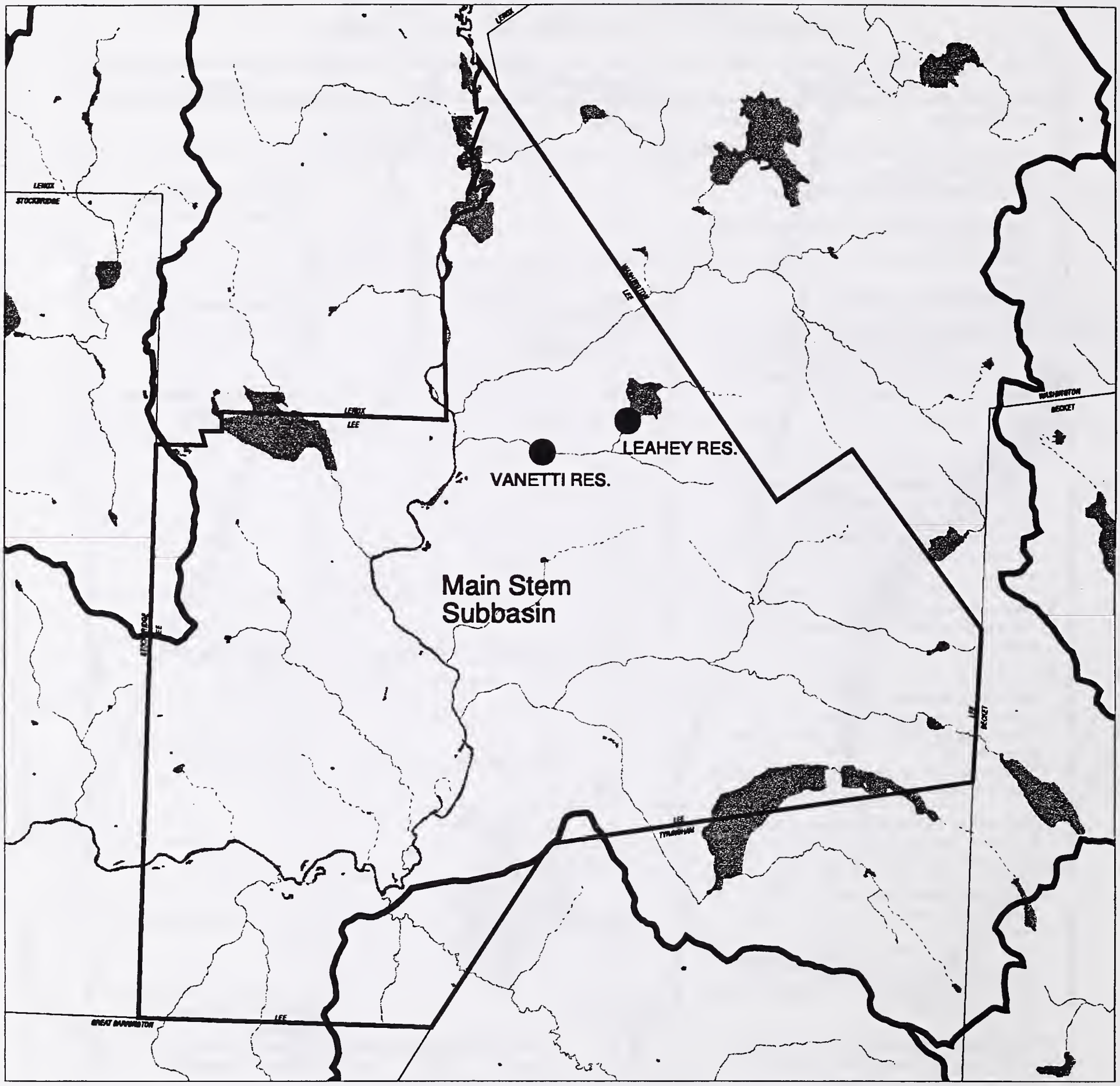
- Community Ground Water
- Community Surface Water
- Surface Water
- Stream
- Intermittent Stream
- Watershed Subbasin
- Towns

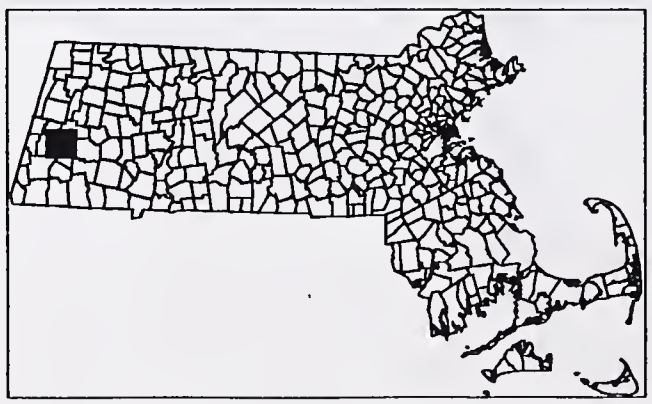
Table A-6
Water Conservation/System Efficiency Status
LANESBOROUGH VILLAGE FIRE AND WATER DISTRICT

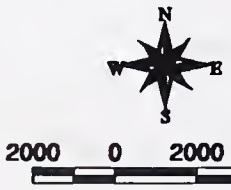
Conservation Standard	Standard Met?	Notes	Recommendation
1. Public Education	Yes	Bill Stuffers, radio and newspaper ads, school programs	
2. Leak Detection and Repair			
- Full leak detection survey every two years	No		Implement a program to check for leaks every two years
- Leak detection and repair included in water system pricing structure	Yes		
3. Metering			
- 100% metered	No	8% metered	Institute program to achieve 100% metering
- Metering program that includes regular maintenance and testing, calibration, repair and replacement	Yes		
- Domestic meter reading and billing 4 times a year	Yes	Every two years	
- Master meters calibrated annually	No		Institute annual master meter calibration program
4. Pricing			
- Water pricing structure should include the full-cost of operating the water supply system	Yes		
- Water supply system operations should be fully funded by water supply system revenues	Yes		
- Rate structures should be regularly be evaluated	Yes		
- Consider pricing options, such as increasing block rate	No	Flat rate	
5. Residential Water Use			
- Water supplier should make available water saving devices	No		Make water saving devices available to residential customers
6. Public Sector Water Use			
- Public buildings should be metered	Yes		
- Public buildings should be retrofitted with water saving devices	No		Retrofit public buildings with water saving devices
- Fire hydrants used by contractors should be metered	No		
- Automatic water sprinklers used at public buildings	No		
7. Industrial, Commercial and Institutional Water Use	No information available		
- These users should develop a written water policy			
- These users should carry out a water audit			
8. Water Supply System Management			
- Water supplier should have a drought emergency plan	No		Develop a drought emergency plan
- Water supplier should develop strategies to reduce daily and seasonal peak demands	Yes		
- Water supplier should carry out water supply system audit every 3-5 years	No information available		Institute water audit to comply with 1992 Conservation Standards
- Water supplier should develop plan to identify all users of water, both metered and unmetered; and how much water is unaccounted for	No	No estimates of unaccounted-for water	Determine amount of unaccounted-for water

Figure A 7

Lee







- Community Ground Water
- Community Surface Water
- Surface Water
- Stream
- Intermittent Stream
- Watershed Subbasin
- Towns

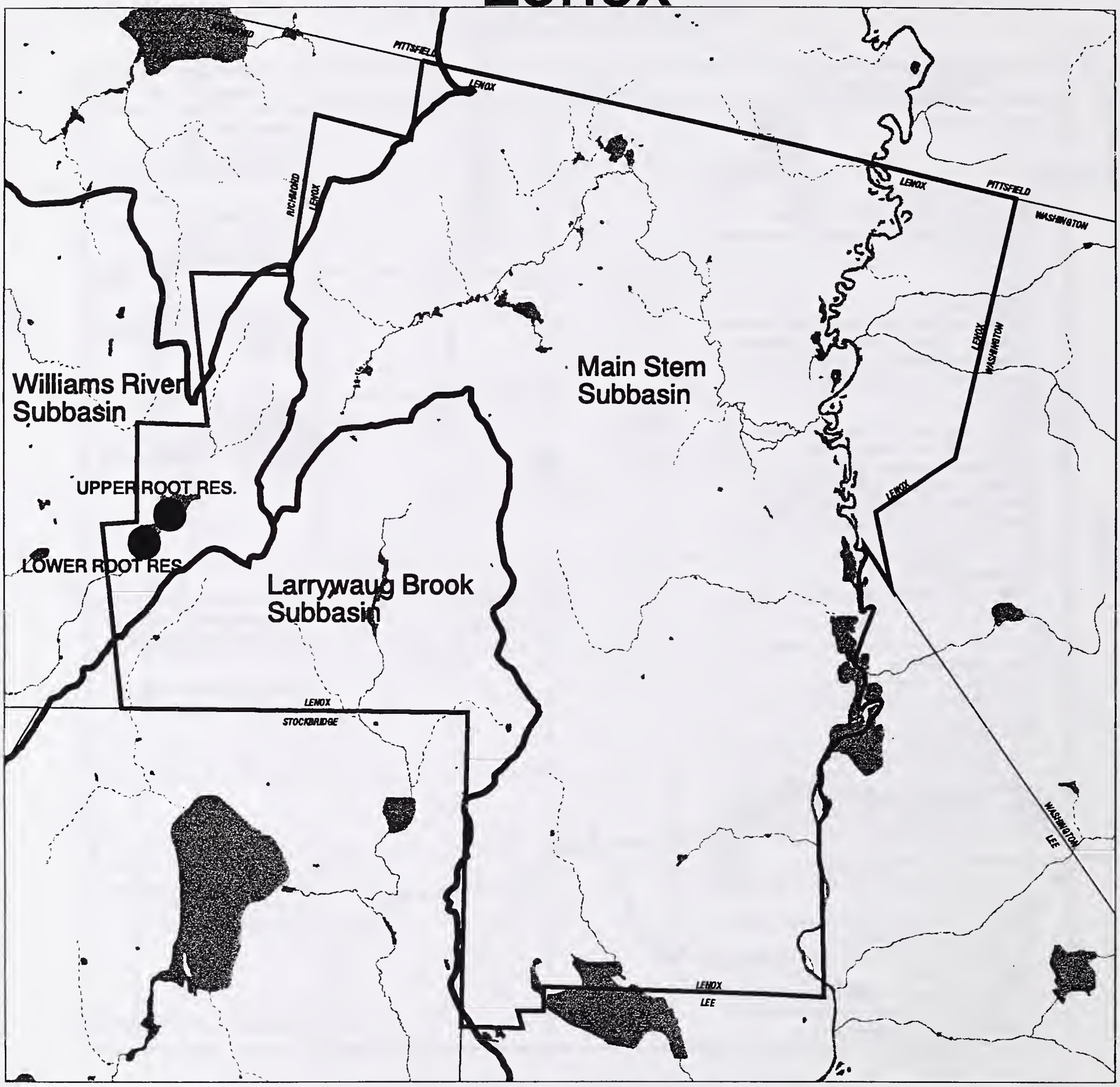
Table A-7
Water Conservation/System Efficiency Status
LEE WATER DEPARTMENT[4]

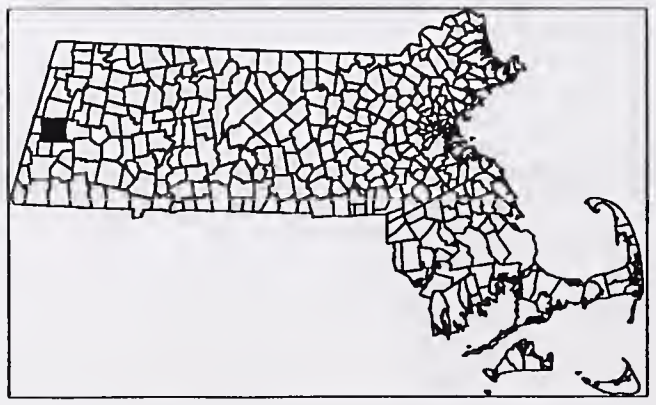
Conservation Standard	Standard Met?	Notes	Recommendation
1. Public Education			Institute public education program in accordance with 1992 Conservation Standards
2. Leak Detection and Repair - Full leak detection survey every two years - Leak detection and repair included in water system pricing structure			Institute leak detection surveys to comply with 1992 Conservation Standards
3. Metering - 100% metered - Metering program that includes regular maintenance and testing, calibration, repair and replacement - Domestic meter reading and billing 4 times a year - Master meters calibrated annually			Institute metering program to comply with 1992 Conservation Standards
4. Pricing - Water pricing structure should include the full-cost of operating the water supply system - Water supply system operations should be fully funded by water supply system revenues - Rate structures should be regularly be evaluated - Consider pricing options, such as increasing block rate			Institute pricing program to comply with 1992 Conservation Standards
5. Residential Water Use - Water supplier should make available water saving devices			Institute residential water saving fixture program to comply with 1992 Conservation Standards
6. Public Sector Water Use - Public buildings should be metered - Public buildings should be retrofitted with water saving devices - Fire hydrants used by contractors should be metered - Automatic water sprinklers used at public buildings			Meter public buildings and retrofit with water saving devices
7. Industrial, Commercial and Institutional Water Use - These users should develop a written water policy - These users should carry out a water audit			
8. Water Supply System Management - Water supplier should have a drought emergency plan - Water supplier should develop strategies to reduce daily and seasonal peak demands - Water supplier should carry out water supply system audit every 3-5 years - Water supplier should develop plan to identify all users of water, both metered and unmetered; and how much water is unaccounted for			Institute a system management program to comply with 1992 Conservation Standards

[4] The Lee Water Department did not return the Water Conservation Questionnaire

Figure A 8

Lenox





2000 0 2000 4000 Feet

- Community Ground Water
- Community Surface Water
- Surface Water
- Stream
- Intermittent Stream
- Watershed Subbasin
- Towns

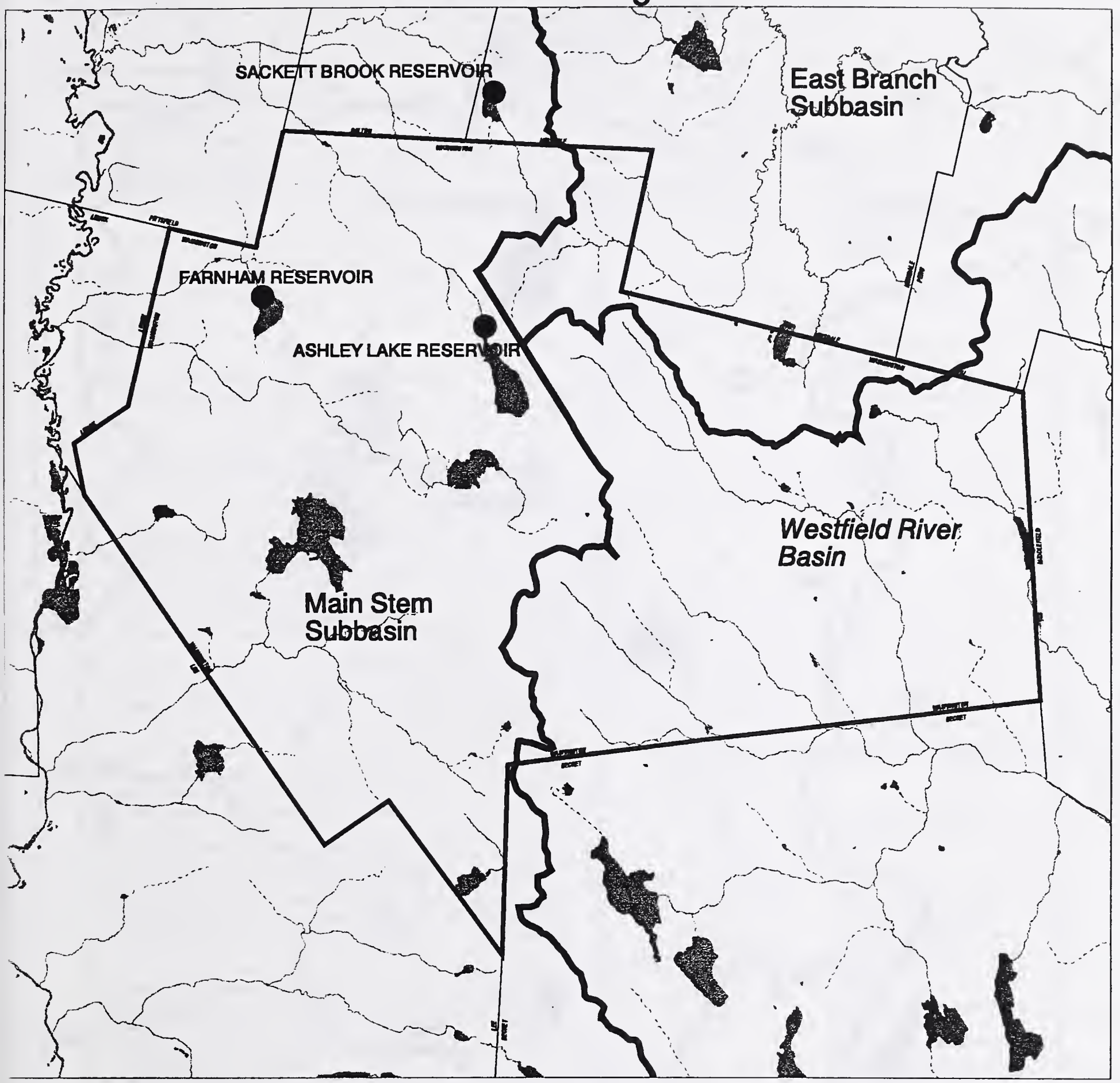
Table A-8
Water Conservation/System Efficiency Status
LENOX DPW/WATER DIVISION

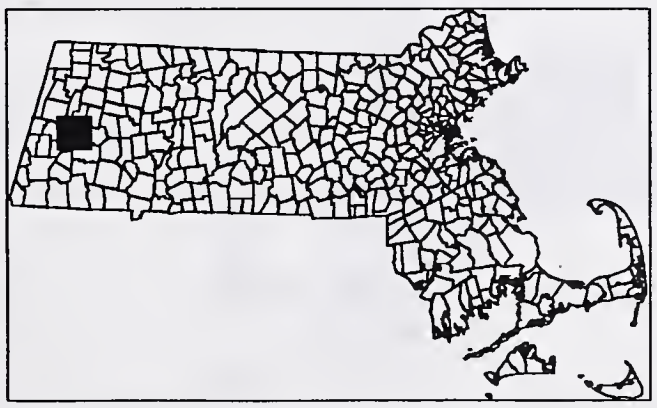
Conservation Standard	Standard Met?	Notes	Recommendation
1. Public Education	No		Institute public education program in accordance with 1992 Conservation Standards
2. Leak Detection and Repair - Full leak detection survey every two years	No	Leak detection survey every ten years	Increase frequency of leak detection surveys to comply with 1992 Conservation Standards
- Leak detection and repair included in water system pricing structure	Yes		
3. Metering - 100% metered	Yes		
- Metering program that includes regular maintenance and testing, calibration, repair and replacement	Yes	Currently replacing all meters with remote readers	
- Domestic meter reading and billing 4 times a year	No	Twice per year	Increase frequency of meter reading and billing to comply with 1992 Conservation Standards
- Master meters calibrated annually	Yes	Master meter calibrated annually	
4. Pricing - Water pricing structure should include the full-cost of operating the water supply system	Yes		
- Water supply system operations should be fully funded by water supply system revenues	Yes		
- Rate structures should be regularly be evaluated	Yes		
- Consider pricing options, such as increasing block rate	Yes	Increasing block rate	
5. Residential Water Use - Water supplier should make available water saving devices	Yes		
6. Public Sector Water Use - Public buildings should be metered	Yes		
- Public buildings should be retrofitted with water saving devices	No		Retrofit public buildings with water saving devices
- Fire hydrants used by contractors should be metered	Sometimes		
- Automatic water sprinklers used at public buildings	No		
7. Industrial, Commercial and Institutional Water Use - These users should develop a written water policy			
- These users should carry out a water audit			
8. Water Supply System Management - Water supplier should have a drought emergency plan	Yes		
- Water supplier should develop strategies to reduce daily and seasonal peak demands	Yes		
- Water supplier should carry out water supply system audit every 3-5 years	No	Water audit every ten years	Increase frequency of water audits to comply with 1992 Conservation Standards
- Water supplier should develop plan to identify all users of water, both metered and unmetered; and how much water is unaccounted for	Yes		

Pittsfield Water Supply

Figure A 9

Town of Washington





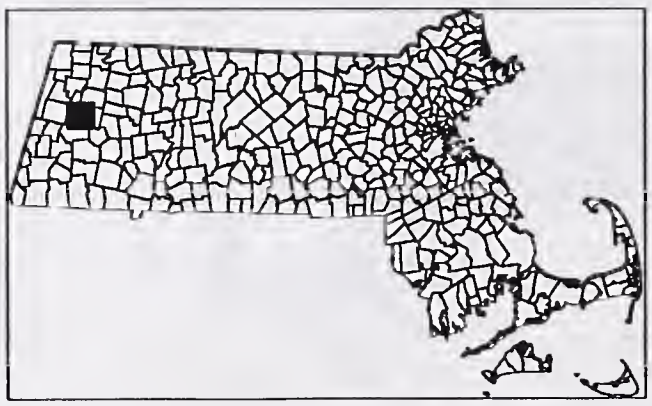
3000 0 3000 6000 Feet

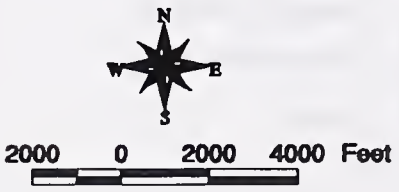
- Community Ground Water
- Community Surface Water
- Surface Water
- Stream
- Intermittent Stream
- Watershed Subbasin
- Towns

Pittsfield Water Supply

Town of Hinsdale

Figure A 9





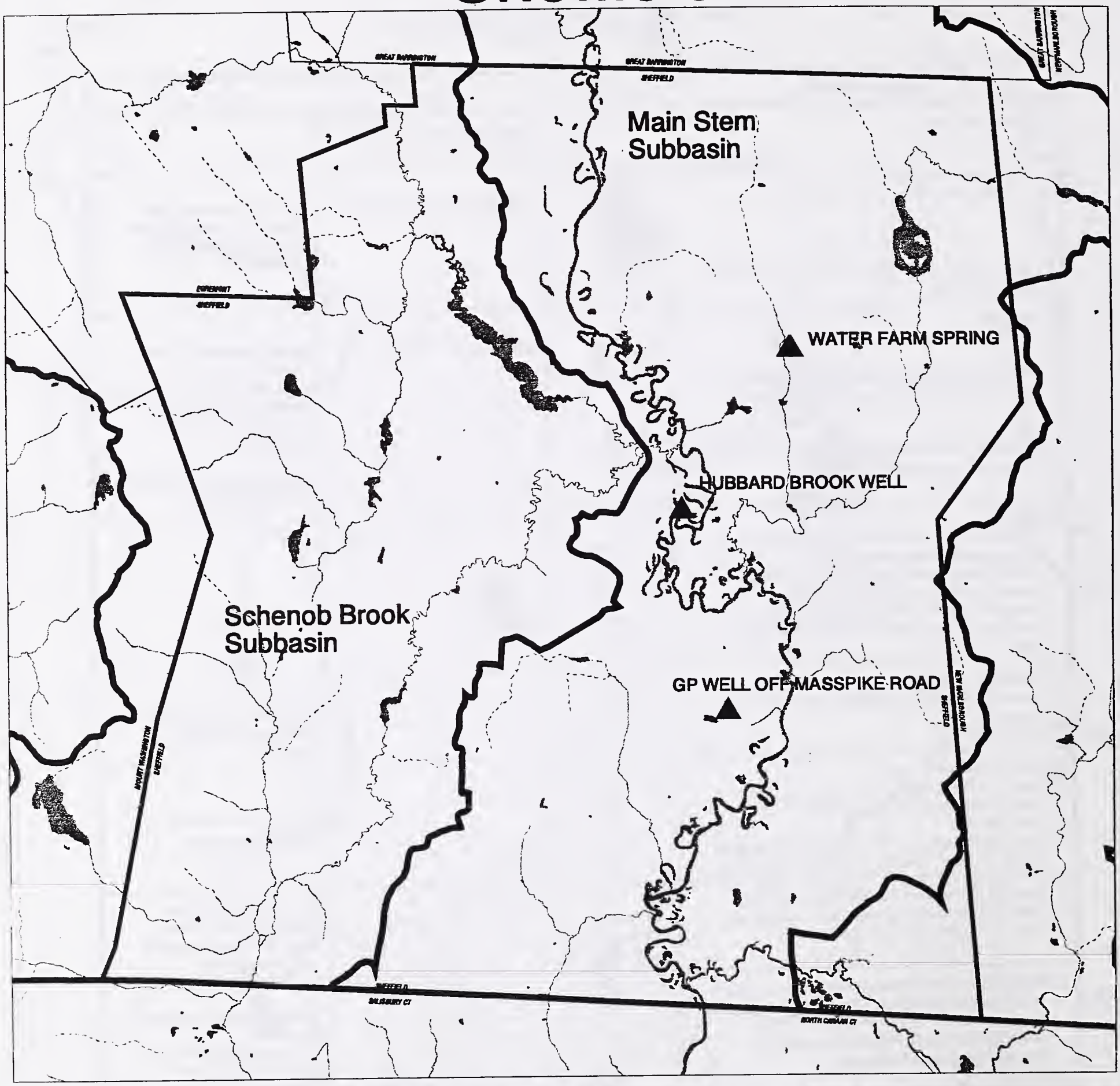
- Community Ground Water
- Community Surface Water
- Surface Water
- Stream
- Intermittent Stream
- Watershed Subbasin
- Towns

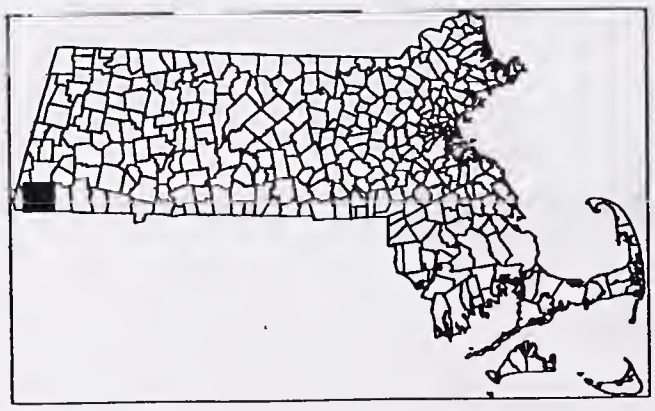
Table A-9
Water Conservation/System Efficiency Status
PITTSFIELD DPW

Conservation Standard	Standard Met?	Notes	Recommendations
1. Public Education	Yes	Bill Stuffers; information on lawn care	
2. Leak Detection and Repair			
- Full leak detection survey every two years	No	Leak detection survey every ten years	Increase frequency of leak detection surveys to comply with 1992 Conservation Standards
- Leak detection and repair included in water system pricing structure	Yes		
3. Metering			
- 100% metered	No	12% metered	Institute program to achieve 100% metering
- Metering program that includes regular maintenance and testing, calibration, repair and replacement	No		Implement a program of regular maintenance and testing, calibration, repair and replacement
- Domestic meter reading and billing 4 times a year	Yes		
- Master meters calibrated annually	No		Institute annual master meter calibration program
4. Pricing			
- Water pricing structure should include the full-cost of operating the water supply system	Yes		
- Water supply system operations should be fully funded by water supply system revenues	Yes		
- Rate structures should be regularly be evaluated	Yes		
- Consider pricing options, such as increasing block rate	No	Flat rate	
5. Residential Water Use			
- Water supplier should make available water saving devices	No		Make water saving devices available to residential customers
6. Public Sector Water Use			
- Public buildings should be metered	Yes		
- Public buildings should be retrofitted with water saving devices	No		Retrofit public buildings with water saving devices
- Fire hydrants used by contractors should be metered	Yes		
- Automatic water sprinklers used at public buildings	No		
7. Industrial, Commercial and Institutional Water Use			
- These users should develop a written water policy	Unknown		Work with industrial and commercial users, where applicable, to develop water conservation policy
- These users should carry out a water audit	Unknown		
8. Water Supply System Management			
- Water supplier should have a drought emergency plan	No		Develop a drought emergency plan
- Water supplier should develop strategies to reduce daily and seasonal peak demands	No		Develop strategies to reduce daily and seasonal peak demands
- Water supplier should carry out water supply system audit every 3-5 years	No		Carry out water supply system audit every 3-5 years
- Water supplier should develop plan to identify all users of water, both metered and unmetered; and how much water is unaccounted for	No	No estimate of unaccounted-for water	Identify all users of water, both metered and unmetered; Determine amount of unaccounted-for water

Figure A 10

Sheffield





3000 0 3000 6000 Feet

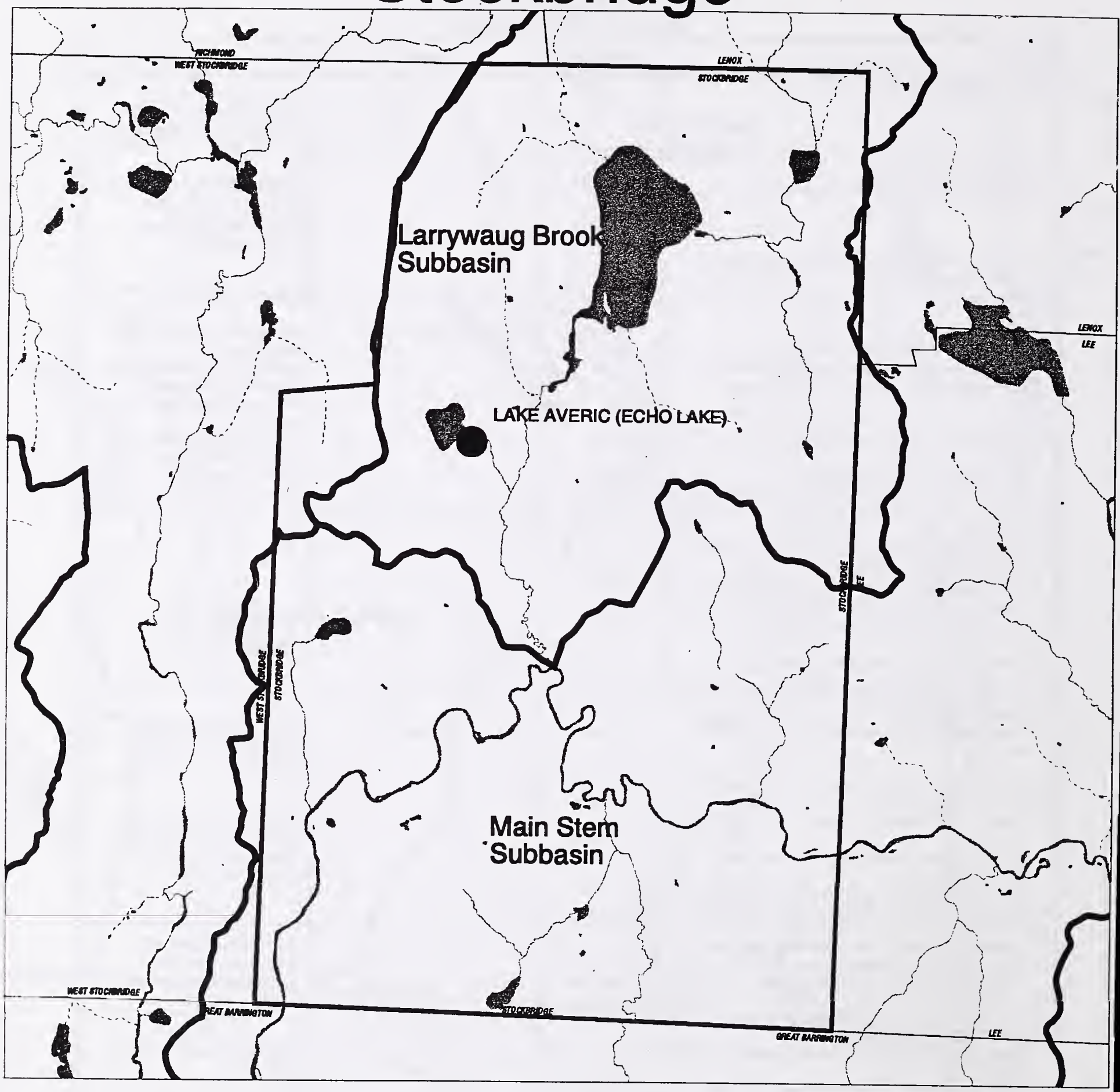
- Community Ground Water
- Community Surface Water
- Surface Water
- Stream
- Intermittent Stream
- Watershed Subbasin
- Towns

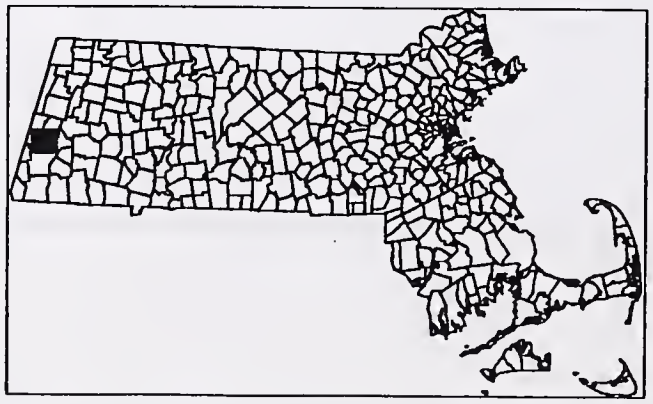
Table A-10
Water Conservation/System Efficiency Status
SHEFFIELD WATER COMPANY

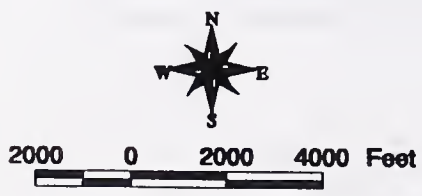
Conservation Standard	Standard Met?	Notes	Recommendations
1. Public Education	No		Institute public education program in accordance with 1992 Conservation Standards
2. Leak Detection and Repair			
- Full leak detection survey every two years	No		Implement a program to check for leaks every two years
- Leak detection and repair included in water system pricing structure	No		Include leak detection as a regular budget item
3. Metering			
- 100% metered	No	No customer meters	Implement a program to meter all customers
- Metering program that includes regular maintenance and testing, calibration, repair and replacement	No		Implement a program of regular maintenance and testing, calibration, repair and replacement
- Domestic meter reading and billing 4 times a year	No		Install residential meters; read and bill 4 times a year
- Master meters calibrated annually	Unknown		Calibrate master meters annually
4. Pricing			
- Water pricing structure should include the full-cost of operating the water supply system	Yes		
- Water supply system operations should be fully funded by water supply system revenues	Yes		
- Rate structures should be regularly be evaluated	No	As needed	Review and evaluate rate structures on a regular basis
- Consider pricing options, such as increasing block rate	No	Flat rate	
5. Residential Water Use			
- Water supplier should make available water saving devices	Yes	Hose vacuum breakers only	Make water saving devices available to residential customers
6. Public Sector Water Use			
- Public buildings should be metered	No		Install meters in all public buildings within service area
- Public buildings should be retrofitted with water saving devices	No		Retrofit public buildings with water saving devices
- Fire hydrants used by contractors should be metered	No		
- Automatic water sprinklers used at public buildings	No		
7. Industrial, Commercial and Institutional Water Use			
- These users should develop a written water policy	Unknown		Work with industrial and commercial users, where applicable, to develop water conservation policy
- These users should carry out a water audit	Unknown		
8. Water Supply System Management			
- Water supplier should have a drought emergency plan	No		Develop a drought emergency plan
- Water supplier should develop strategies to reduce daily and seasonal peak demands	Yes		
- Water supplier should carry out water supply system audit every 3-5 years	No		Carry out water supply system audit every 3-5 years
- Water supplier should develop plan to identify all users of water, both metered and unmetered; and how much water is unaccounted for	No	No estimate of unaccounted-for water	Identify all users of water, both metered and unmetered; Determine amount of unaccounted-for water

Figure A 11

Stockbridge







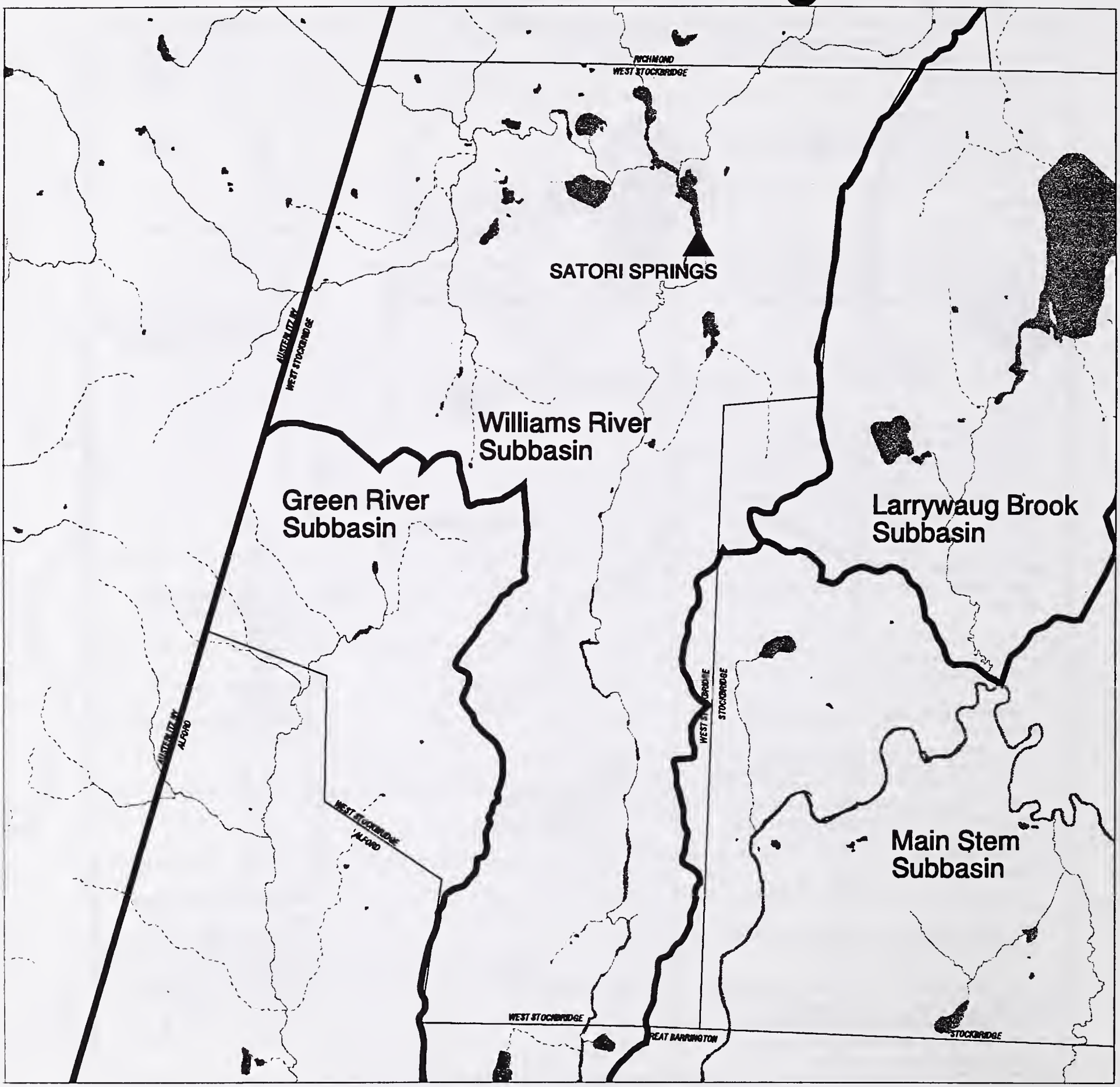
- Community Ground Water
- Community Surface Water
- Surface Water
- Stream
- Intermittent Stream
- Watershed Subbasin
- Towns

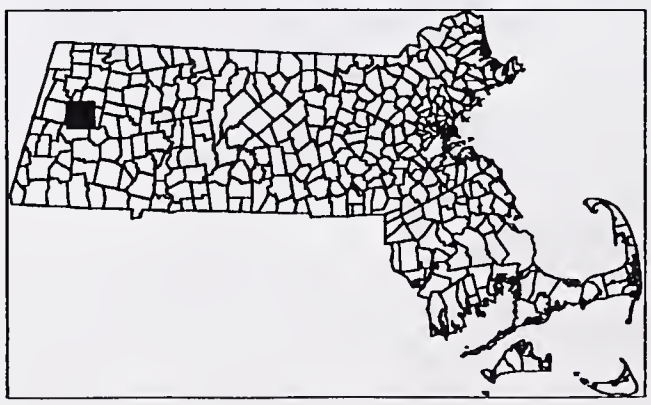
Table A-11
Water Conservation/System Efficiency Status
STOCKBRIDGE WATER DEPARTMENT

Conservation Standard	Standard Met?	Notes	Recommendations
1. Public Education	Yes	Bill Stuffers	
2. Leak Detection and Repair			
- Full leak detection survey every two years	Yes		
- Leak detection and repair included in water system pricing structure	Yes		
3. Metering			
- 100% metered	No	87% metered	Institute program to achieve 100% metering
- Metering program that includes regular maintenance and testing, calibration, repair and replacement	Yes	Regular program to replace meters every ten years	
- Domestic meter reading and billing 4 times a year	No	Read and billed every six months	Increase meter reading and billing frequency to comply with 1992 Conservation Standards
- Master meters calibrated annually	Yes		
4. Pricing			
- Water pricing structure should include the full-cost of operating the water supply system	Yes		
- Water supply system operations should be fully funded by water supply system revenues	Yes		
- Rate structures should be regularly be evaluated	Yes		
- Consider pricing options, such as increasing block rate	Yes	Increasing block rate	
5. Residential Water Use			
- Water supplier should make available water saving devices	No		Make water saving devices available to residential customers
6. Public Sector Water Use			
- Public buildings should be metered	No	Schools only	Install meters in all public buildings
- Public buildings should be retrofitted with water saving devices	No		Retrofit public buildings with water saving devices
- Fire hydrants used by contractors should be metered	No		
- Automatic water sprinklers used at public buildings	No		
7. Industrial, Commercial and Institutional Water Use	Not applicable		
- These users should develop a written water policy			
- These users should carry out a water audit			
8. Water Supply System Management			
- Water supplier should have a drought emergency plan	No		Develop a drought emergency plan
- Water supplier should develop strategies to reduce daily and seasonal peak demands	No		Develop strategies to reduce daily and seasonal peak demands
- Water supplier should carry out water supply system audit every 3-5 years	No		Carry out water supply system audit every 3-5 years
- Water supplier should develop plan to identify all users of water, both metered and unmetered; and how much water is unaccounted for	Yes		

Figure A 12

West Stockbridge





N
W E
S

2000 0 2000 4000 Feet

Community Ground Water
Community Surface Water
Surface Water
Stream
Intermittent Stream
Watershed Subbasin
Towns

Table A-12
Water Conservation/System Efficiency Status
WEST STOCKBRIDGE WATER DEPARTMENT[5]

Conservation Standard	Standard Met?	Notes	Recommendations
1. Public Education			Institute public education program in accordance with 1992 Conservation Standards
2. Leak Detection and Repair - Full leak detection survey every two years - Leak detection and repair included in water system pricing structure		Town recently took private water company by eminent domain. System is undergoing a complete rehabilitation.	Continue to upgrade system. Institute leak detection program once upgrade is complete.
3. Metering - 100% metered - Metering program that includes regular maintenance and testing, calibration, repair and replacement - Domestic meter reading and billing 4 times a year - Master meters calibrated annually			Institute program to achieve 100% metering Increase meter reading and billing frequency to comply with 1992 Conservation Standards Calibrate meters annually
4. Pricing - Water pricing structure should include the full-cost of operating the water supply system - Water supply system operations should be fully funded by water supply system revenues - Rate structures should be regularly be evaluated - Consider pricing options, such as increasing block rate			Institute pricing program to comply with 1992 Conservation Standards
5. Residential Water Use - Water supplier should make available water saving devices			Make water saving devices available to residential customers
6. Public Sector Water Use - Public buildings should be metered - Public buildings should be retrofitted with water saving devices - Fire hydrants used by contractors should be metered - Automatic water sprinklers used at public buildings			Install meters in all public buildings Retrofit public buildings with water saving devices
7. Industrial, Commercial and Institutional Water Use - These users should develop a written water policy - These users should carry out a water audit	Not applicable		
8. Water Supply System Management - Water supplier should have a drought emergency plan - Water supplier should develop strategies to reduce daily and seasonal peak demands - Water supplier should carry out water supply system audit every 3-5 years - Water supplier should develop plan to identify all users of water, both metered and unmetered; and how much water is unaccounted for	No No No Yes		Develop a drought emergency plan Develop strategies to reduce daily and seasonal peak demands Carry out water supply system audit every 3-5 years

[5] The West Stockbridge Water Department did not submit a Water Conservation Questionnaire. The information provided here was obtained through phone conversations.

APPENDIX B
LITERATURE CITED

Norvitch, Ralph F., Donald F. Farrell, Felix H. Pauszek and Richard G. Petersen. Hydrology and Water Resources of the Housatonic River Basin, Massachusetts, 1968. USGS Hydrologic Investigations Atlas HA-281.